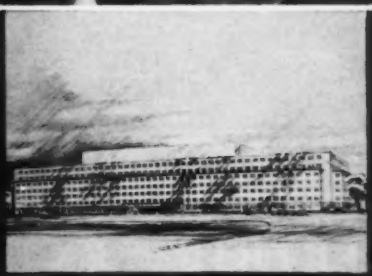
ELECTRICAL CONSTRUCTION AND MAINTENANCE

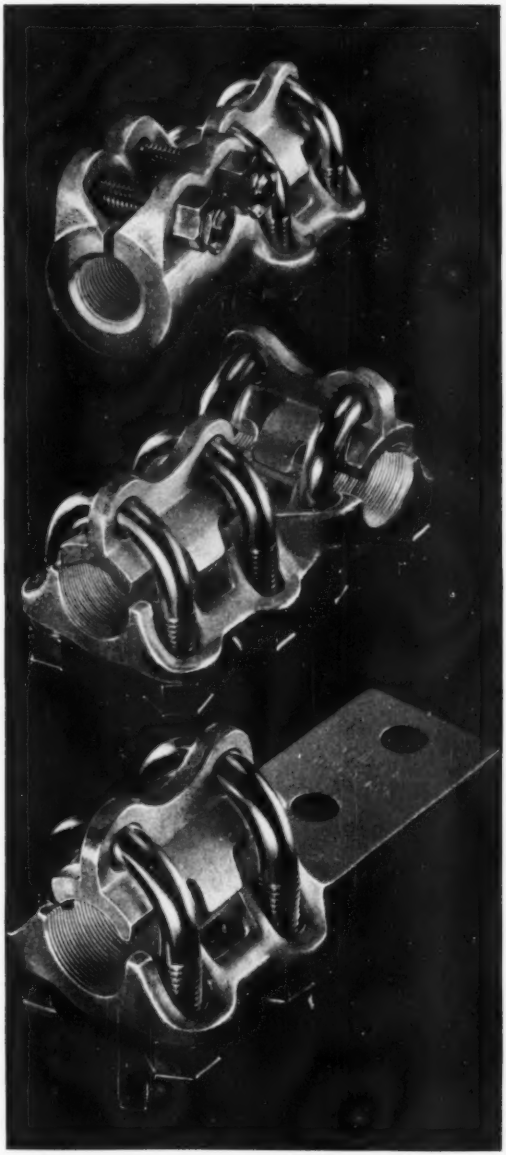


A McGRAW-HILL PUBLICATION 50TH YEAR

Low joint resistance... high resistance to corrosion

POWER CONNECTORS

Silver plated on all contact surfaces!



Silver on all current-carrying surfaces is just one of the ways in which G-E power connectors reduce joint resistance and minimize corrosion. Carefully regulated copper content of connector alloy provides current-carrying ability equal to that of conductor. Sharp, machine-serrated contact surfaces bite into the conductor, giving a permanent high conductivity joint that resists vibration and maintains positive pressure at all times. Interlocking sides confine the strands of the cable within the enclosure, reducing inter-strand resistance and taking full advantage of the cable's current-carrying capacity. Non-corrodible hardware of high-strength bronze alloy assures permanent tightness of connections.

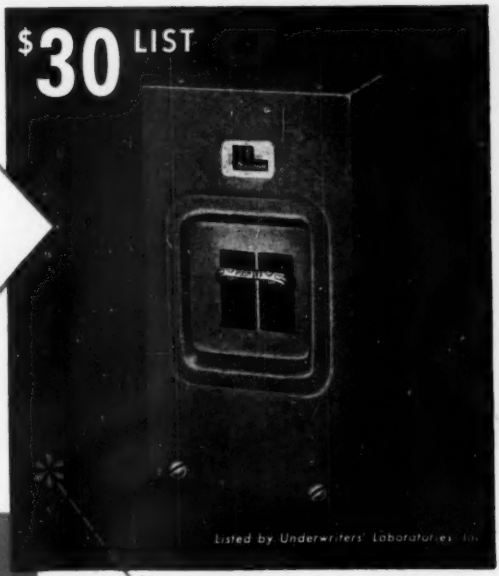
There's a wide range of types—straight, tee, block, angle, parallel, expansion, ground, and many others. Why not place a trial order with your G-E sales representative? Write for Bulletin GEC-400—it contains 44 pages of valuable connector information. Section 856-57, General Electric Company, Schenectady 5, N. Y.

856-57

GENERAL ELECTRIC

100 AMP. CIRCUIT BREAKER PROTECTION AT FUSE BOX PRICES

Another new Murray product



that gives you

Fully Magnetic! protection

LOW PRICE!

In the Murray 100 Amp. Service Control you get circuit breaker protection priced as low as comparable fused equipment.

MANY ADVANTAGES!

1. Fully magnetic circuit protection.
2. Carries full load regardless of temperature.
3. Plenty of room for easy wiring.
4. Compact (12-1/16 x 6-13/16 x 3-7/8 — Indoor, surface type).
5. Easy to gang (No side handles).
6. Flush or surface mounting.

WHAT IS IT?

Service control equipment—3 wire, single phase, 120-240 Volts AC. Available in two types: 1—Indoor (surface or flush) or 2—Outdoor (raintight). Supplied with handle extensions for simultaneous manual tripping of two single pole independent trip fully magnetic circuit breakers in 70, 90, or 100 amps.

HOW IS IT USED?

1. Same application as a 100 amp. 3 wire fused switch with neutral or a 100 amp. 2 wire fused switch without neutral.
2. As Service Entrance Equipment.
3. As a main disconnect.
4. For protecting single phase lighting and appliance circuits or for fractional horse-power motor circuits.

IS IT AVAILABLE?

Yes! Call your distributor or contact your nearest Murray representative. Catalog numbers: Indoor—LV2IIA (Add S or F to indicate surface or flush mounting). Outdoor—LR2IIC (At slightly higher list price).

Murray®

FOR DETAILED INFORMATION, WRITE:

MURRAY MANUFACTURING CORPORATION

1250 Atlantic Avenue • Brooklyn 16, New York

Service Entrance & Meter Equipment • Magnetic Circuit Breakers • Switches
Current Limiting Reactors • Crows'nest Aerial Ladders

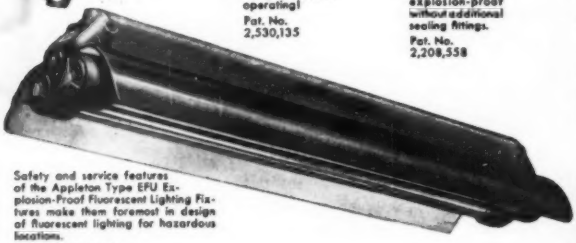
Seal the sparks that spell disaster!

APPLETON EXPLOSION-PROOF EQUIPMENT

Type FSQX Explosion-Proof and Dust-Tight Plug and Receptacle with interlocking safety switch.

Vented Type EVX Explosion-Proof Lighting Fixture. 10% more light, 30% lighter in weight—cooler operating!
Pat. No. 2,530,135

The Appleton Seal-Line Switch Unilet is a combination switch housing and sealing unit. Completely explosion-proof without additional sealing fittings.
Pat. No. 2,208,558



Safety and service features of the Appleton Type EFU Explosion-Proof Fluorescent Lighting Fixtures make them foremost in design of fluorescent lighting for hazardous locations.
Pat. No. 2,392,202

When released in a flammable atmosphere, the tiniest electrical spark can reduce the greatest industrial plant to worthless ruin. To guard against this sudden disaster, Appleton explosion-proof conduit fittings and fixtures are expertly designed to completely seal off dangerous arcs that lurk in the wiring systems of chemical plants, oil refineries, hospital surgeries—wherever explosive or flammable vapors, dusts or gases are present.

Appleton Explosion-Proof equipment is easy to install and service. And among the hundreds of fittings and fixtures in the complete Appleton line is an explosion-proof fitting exactly suited to your needs.

No matter what your lighting or wiring requirements—explosion-proof or otherwise, specify Appleton, supplier to American builders for nearly half a century.

Sold Through Electrical Wholesalers

APPLETON ELECTRIC COMPANY

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MALLEABLE IRON CONDUIT FITTINGS

APPLETON

OUTLET BOXES AND SWITCH BOXES

ELECTRIC

INDUSTRIAL LIGHTING EQUIPMENT

PRODUCTS

EXPLOSION-PROOF FITTINGS • REELITES

ELECTRICAL CONSTRUCTION AND MAINTENANCE

Published for electrical contractors, industrial electricians, engineers, consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management, in the field of electrical construction and maintenance.

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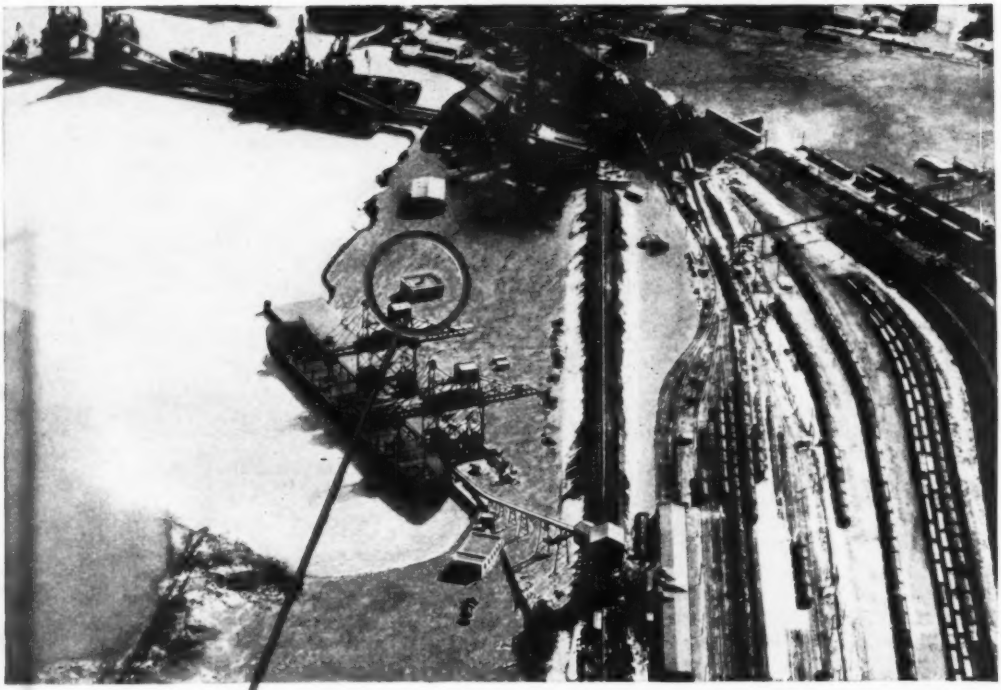
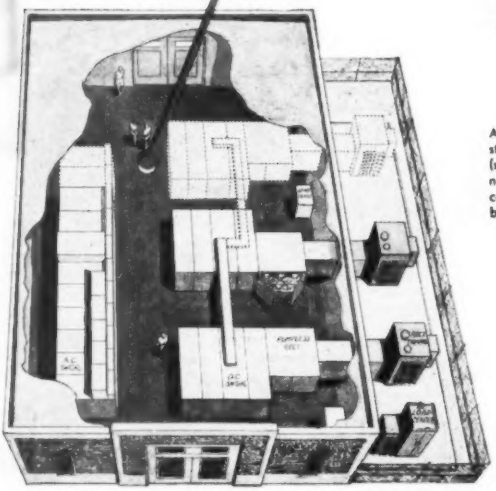
G-E switchgear protects operation



Aerial view of the new Baltimore and Ohio ore facility in the Curtis Bay section of the Port of Baltimore. Circled building marks location of the modern G-E substation equipment which supplies power for the two unloaders and two General Electric pusher locomotives that are used to spot gondola cars for loading.



Artist's drawing of the G-E substation showing two 1000 kw d-c substations, a-c substation and metal-clad switchgear. Additional units (sketched in phantom form) show location of the equipment that will be needed for future plans which call for doubling the present unloading capacity. Another d-c load center and two more switchgear units will be needed.

# of new $5,000,000 investment!

New B&O unloaders move 2000 tons an hour around-the-clock. Continuous power supplied with modern d-c substation and metal-clad switchgear.

Strategic ore from Liberia and South America takes less time to get to the nation's steel producing centers when it is unloaded at the Baltimore and Ohio's new ore facility in the Curtis Bay section of the Port of Baltimore.

Incorporating the latest improvements in design and equipment, the new ore dock has a working capacity of 2000 tons an hour. The two highly efficient unloaders reduce turn-around time for ore boats and provide an almost continuous stream of ore-laden railroad cars for iron and steel mills. These same cars return to Baltimore loaded with coal, give B & O a two-way pay load for greater efficiency.

Continuous power for 24-hour operation is supplied by modern G-E substations. Two 1000 kw d-c substations supply the main power for the entire installation, while an a-c substation supplies auxiliary power and lighting. G-E metal-clad switchgear provides control and protection for the incoming and outgoing feeders to a-c and d-c load centers.

Forward-looking G-E engineers are ready to apply the knowledge gained from this, and hundreds of other installations, to *your* problems. Investigate today the many advantages of using General Electric switchgear in your plant for efficient, flexible power distribution. Contact your G-E sales representative, or write for bulletin GEA-3083 Metal-clad switchgear. General Electric Company, Schenectady 5, N. Y.

G-E metal-clad switchgear for the 13.2 kv feeders to a-c and d-c substations. All components are metal-enclosed for protection to personnel. Because units are factory-built and arrive ready to install, total installed cost is greatly reduced.

View of the operating aisle of the d-c substation. New G-E pumpless rectifiers provide continuous low-cost d-c power conversion. Minimum number of moving parts reduces maintenance. All parts are easily accessible.

GENERAL ELECTRIC

254-38

GUARANTEE of

ACCURATE

QUALITY ELECTRICAL

TAPES

BLUEPRINT FOR KNOW-HOW!

ACCURATE
FRICTION TAPES

Quality made of highest grade rubber and finest cotton base. Affords maximum mechanical protection. Available in Standard and A.S.T.M. - Specification grades.

ACCURATE
RUBBER TAPES

Offers high elasticity, excellent cohesion, high dielectric strength and super aging qualities; made in both Standard and A.S.T.M. - A.A.R. grades.

ACCURATE
PLASTIC TAPE

Thin caliper reduces bulk in tight spots. Strong mechanically and offers high dielectric strength. Recommended for use wherever plastic tape is practical.

TAPE TIPS:
FOR ELECTRICIANS

Use rubber tape that coheres without heat or extra pressure. That's Accurate Tape! Easier to apply and actually improves with age. Remember — it's Accurate Rubber for greater electrical strength, Accurate Friction for positive mechanical protection!

ACCURATE YOUR BEST BUY IN TAPE

. MORE THAN A QUARTER CENTURY OF TAPE SPECIALIZATION

This bank of 37.5 kva dry-type transformers supplies power to a test panel. Wherever lighting is altered or machines are relocated, "dry-types" can be moved quickly.

Short Cut
TO QUICK PLANT CONVERSION

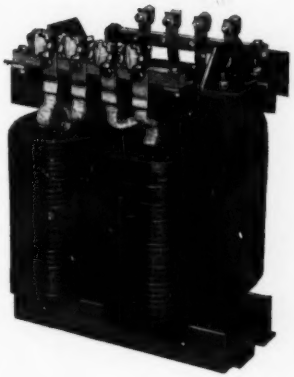
ON THE TEST FLOOR of a large Midwest manufacturer, this bank of 37.5 kva dry-type transformers supplies voltage for accurate switchgear testing. Combinations of 60 and 110 volts up to 2200 volts are used for switchgear durability, rupture, life and heat tests. But in spite of almost continuous service since November, 1942, the transformers required virtually no maintenance.

As this company found, the light, portable Allis-Chalmers dry-type transformer is a convenient means of putting power close to the load without loss of time or trouble. Because it speeds changeovers on lighting and power services, it prevents costly delays in supplying correct voltage to lighting, motors or heating equipment. At the same time it eliminates long, expensive secondary feeders and hard-to-get copper.

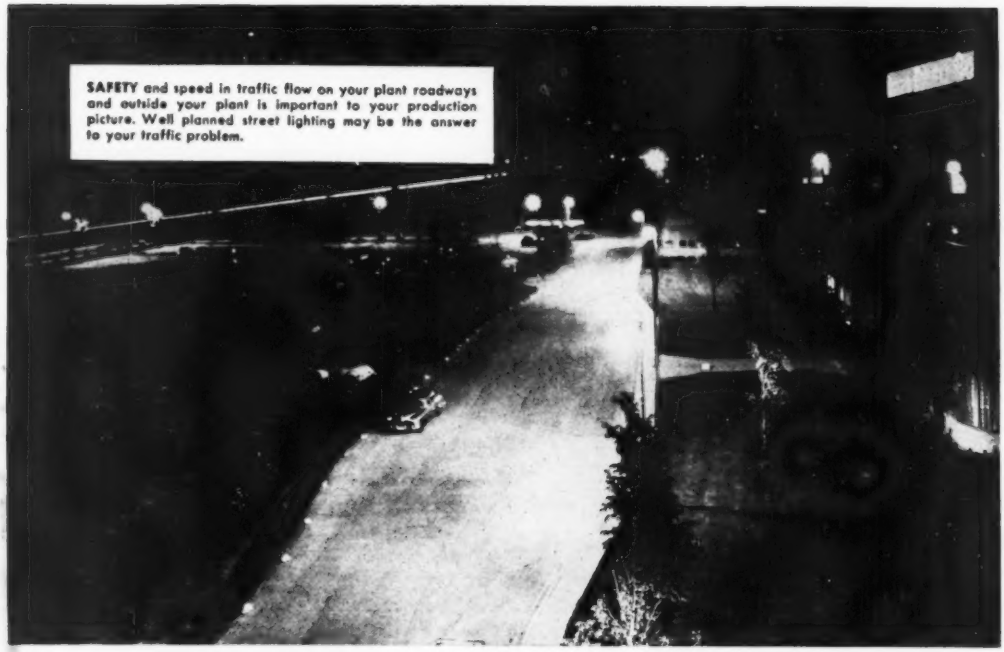
That's why the A-C dry-type transformer can help in making emergency rearrangements of plant layout or of spotting power for relocated machines. The Allis-Chalmers dry-type transformer is easy to install. Solderless connectors on popular sizes reduce hook up time to minutes.

Allis-Chalmers general purpose dry-type transformers are built in single phase sizes — 200 kva and smaller; three phase sizes — 300 kva and smaller, 600 volts and below. For more information consult your A-C sales office, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for bulletin 61B6382A.

A-3441



ALLIS-CHALMERS



SAFETY and speed in traffic flow on your plant roadways and outside your plant is important to your production picture. Well planned street lighting may be the answer to your traffic problem.

Can you afford to neglect Lighting on your outdoor production lines?

As production becomes the key word in today's industrial picture, you are again faced with the problem of "keeping 'em rolling" from entrance gate to railroad siding.

Plan now to keep the out-of-doors elements of your plant at peak operation with soundly planned outdoor lighting. New types of fixtures, improved lighting techniques, minor adjustment of your present lighting equipment can give you a completely modern system at moderate cost.

For planning help call in the lighting specialist at your local G-E office. He is trained in today's lighting requirements and techniques. Or write for the free bulletin *Outdoor Lighting for Industrial Plants. (GEA-3640.) Apparatus Department, General Electric Company, Schenectady 5, N. Y.*

SPEED is becoming the vital factor in production and distribution. For a modest investment outdoor lighting can add speed to your operation.

PROTECTION offered by fences and walls can be doubled by adequate protective lighting. Give your plant the protection of a complete lighting system.

GENERAL ELECTRIC

451-161

Uptegraff DRY TYPE TRANSFORMERS

Easy to Install · Economical Dependable

Uptegraff type DB Dry Type Transformer with ventilated weatherproof enclosure, for indoor or outdoor service. Sizes, 7.5 to 500 KVA.

Type F Dry Type Transformer, for protected cabinet mounting, or indoor service. Standard sizes, 0.25 to 15 KVA. Can be built in larger sizes.

Completely enclosed type E Uptegraff Transformer. Available in sizes from 0.25 to 10 KVA, for indoor service. All Uptegraff transformers are built and tested in accordance with the applicable standards of the N.E.M.A., the A.S.A., and the A.I.E.E.

The built-in dependability and economy of Uptegraff Dry Type Transformers comes from engineering and manufacturing skill and experience. All Uptegraff Dry Type Transformers are made with durable, non-inflammable Class B insulating materials. Available in standard types and sizes from 0.25 to 2000 KVA, and in special styles to meet individual specifications when required by the application.

Some of the more popular Uptegraff "Specialty" Dry Type Transformers are illustrated here. Write for a copy of bulletin No. 126, which gives full information on all types and sizes of Uptegraff Dry Type Transformers. If you wish detailed data and prices, give capacity required and service for which the transformer is intended.

R. E. UPTEGRAFF MANUFACTURING COMPANY

SCOTTDALE, PENNSYLVANIA

Makers of POWER • DISTRIBUTION • INSTRUMENT • SPECIALTY TRANSFORMERS

Accessible FOR QUICK INSPECTION!

ALLIS-CHALMERS Type H Starter cubicles are divided into three main compartments to assure quick, easy and safe maintenance checks.

1. **High Voltage Fuse Compartment** — enclosed by an electrically interlocked door which disconnects the load when fuses are exposed.
2. **Low Voltage Compartment** — houses control relays and accessories . . . accessible through a 68" door.
3. **Rear High Voltage Compartment** — all high voltage components are accessible through the full length rear door.

ALLIS-CHALMERS
Type H Starters
FOR 2300 TO 5000 VOLT MOTORS

Contactors, overload relays, short circuit fuses . . . everything you need for complete control of your motors is readily accessible in the attractive, easy to install steel cabinet of a Type H Starter.

For full or reduced voltage starting, reversing or dynamic braking of squirrel-cage, wound rotor and synchronous motors . . . Allis-Chalmers Type H Starters will be your right answer. They are engineered for dependability, designed for ready access, and built to give long life with low maintenance. Call your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin for bulletin 14B6410A. A-3349

MAXIMUM HORSEPOWER

	AIR CONTACTOR		OIL CONTACTOR	
2000-2500 VOLTS	Synchronous		Synchronous	
	1.0 PF	.8 PF	1.0 PF	.8 PF
	1500	1250	800	700
	Induction 1250		Induction 700	
4000-5000 VOLTS	Synchronous		Synchronous	
	1.0 PF	.8 PF	1.0 PF	.8 PF
	2500	2250	800	700
	Induction 2250		Induction 700	

Specify the Type 256 Air Break Contactor, shown in the starter at left, for tough, repetitive duty and long contact life . . . Type MO Oil Immersed Contactor for normal starting duty or for service in dust laden, corrosive or very moist atmospheres.

ALLIS-CHALMERS

PARKWAY CABLE

Photo courtesy of Barber-Greene Company

For economical, direct-in-the-ground burial

YOU'LL CUT EXPENSE to the minimum by adopting Roebling Parkway Cable for distribution and general power supply circuits. This cable is buried directly in a shallow, economical trench... and assures you dependable, maintenance-free service year in, year out.

Roebling Parkway Cable is made in single and multiple conductor — solid or stranded — in a range from 600 to 5,000 volts. Furnished with metallic armor or non-metallic ROEPRENE sheath, depending upon the amount of physical protection required.

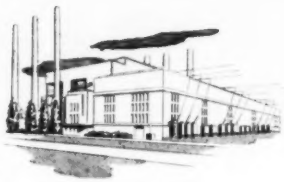
C. A. A. Approved for Airport Lighting

Roebling Type A cable for 600 volts, and Type B for 3,000 and 5,000 volts, pass all C.A.A. requirements for Specification No. L-824. Both types are made in single and multiple conductor construction. Type A has RP insulation; the insulation of Type B is ozone-resistant oil-base rubber.

Large quantities of Roebling's full line of electrical wires and cables are called for in the national rearmament program. The Roebling organization and distributors will always, however, give you the best service and deliveries within their power. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

Atlanta, 934 Avon Ave ★ ***Boston,*** 51 Sleeper St ★ ***Chicago,*** 5525 W. Roosevelt Rd ★ ***Cincinnati,*** 3253 Fredonia Ave ★ ***Cleveland,*** 701 St. Clair Ave, N.E. ★ ***Denver,*** 4801 Jackson St ★ ***Houston,*** 6216 Navigation Blvd ★ ***Los Angeles,*** 216 S. Alameda St ★ ***New York,*** 19 Rector St ★ ***Odessa, Texas,*** 1920 E. 2nd St ★ ***Philadelphia,*** 230 Vine St ★ ***San Francisco,*** 1740 17th St ★ ***Seattle,*** 900 1st Ave, S. ★ ***Tulsa,*** 321 N. Cheyenne St
Export Sales Office, ***Trenton, N. J.***



Pacific Gas and Electric's New Contra Costa Steam Plant

Wired *the Modern Way*

with ELECTRUNITE E.M.T. Raceways

Electricity is the business of the Pacific Gas and Electric Company. And you can be sure that any electrical product used in their own plants meets their rigid requirements for safety, dependability and sound installation practice.

ELECTRUNITE E.M.T.—the *modern,* lightweight, rigid steel raceway—does all of that, *and more.* ELECTRUNITE E.M.T. saves trouble and time on installations, too.

Stubs, bends, offsets can be formed easily and accurately—on the job or prefabricated. And installations in hard-to-get-at places are easy with ELECTRUNITE E.M.T. No turning of tubing is needed. Modern compression fittings set up strong, concrete-tight joints. Wire pulling is easier, too. The knurled inside surface of ELECTRUNITE E.M.T. (in most-used sizes) reduces drag as much as 30%!

ELECTRUNITE E. M. T. is approved for exposed, concealed and concrete slab installations by the National Electrical Code, and meets the requirements of Underwriters' Laboratories.

CHECK WITH YOUR ELECTRUNITE DISTRIBUTOR

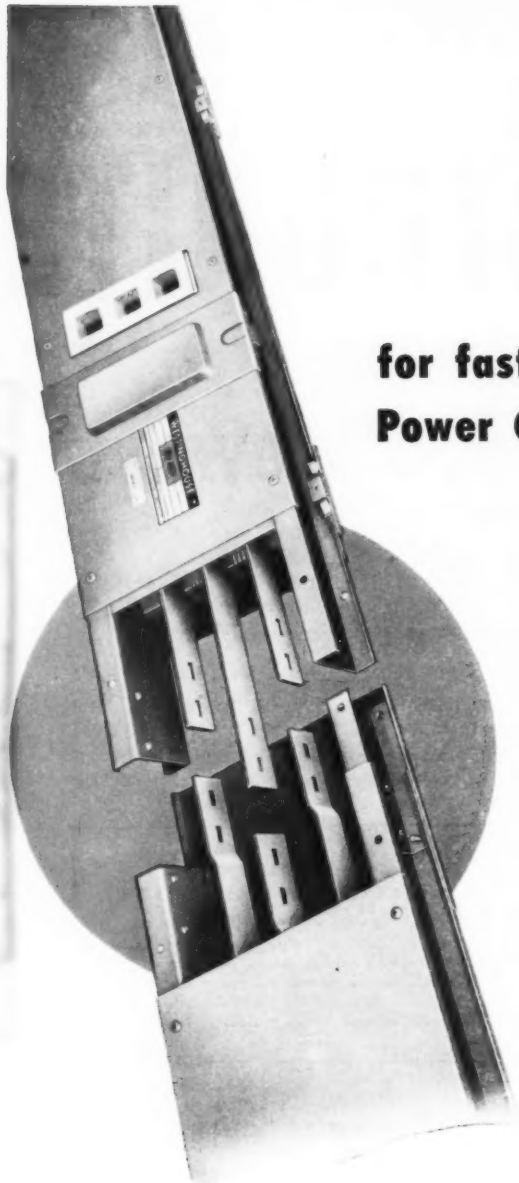
Give him as much time as possible to plan ahead on your requirements. And even though he may be unable to supply all of your raceway needs, you can be sure that he will do everything possible to help solve your material supply problems.

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION • CLEVELAND 8, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL

Republic
ELECTRUNITE E.M.T.

LIGHTWEIGHT THREADLESS RIGID STEEL RACEWAY



BUS DUCT IS FLEXIBLE

for faster, lower cost Power Conversion or Expansion

Wasting time unraveling wire mazes? Wasting money "doubling up" on cable? Check these points of convenience provided in Westinghouse Bus Duct to speed power-line layout, simplify installation.

- Prefabricated sections, any length . . . convenient to handle, mount, and install with channel-type splice plates (illustrated).
- Plug-in receptacles every foot . . . eliminate long, secondary cable runs, facilitate rapid machine tie-ins, any time.
- To extend power-line runs . . . simply add sections of duct.
- To relocate duct . . . dismantle, rearrange, remount . . . no cable slicing or splicing; equipment fully salvageable; minimum outage time.
- Standardized ells, tees, crossovers . . . no problem with tight layouts, turns in any plane.
- Cantilever hangers . . . quickly aligned and bolted.
- Higher carrying capacity pound for pound than cable or conduit.
- 4 types of Westinghouse Bus Duct meet all load requirements, any service condition from transformer to machine.

Call your Westinghouse distributor for the full story, or write for Bus Duct Manual B-4272A, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-30057

DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

YOU CAN BE SURE.. IF IT'S Westinghouse BUS DUCT

"What's Cookin'" on the other side of the mountain?

WHEN a locomotive engineer heads his train into a miles long tunnel under a mountain he wants to be reasonably sure that the track is clear not only in the tunnel but on the other side too. Frequently the only way he can get that information is through signal systems. When they are sitting on a siding signal cables may not look like much but once they are installed and connected they are a most important piece of equipment to a locomotive engineer.

Railroad Signal Cables carry a heavy burden of responsibility for the safety of passing trains. For that reason Railroad Signal Engineers are more often than not apt to be very "choosy" about the kind of signaling equipment they buy and install. More and more these days you will see Simplex-ANHYDREX Signal Cables like these being installed by railroads all over this country.

These cables are installed underground and overhead, in tunnels or in bright burning desert sunlight, on signal bridges across busy terminal tracks or buried in the slime and mud of swampy land. Why this trend to ANHYDREX Signal Cables? Because they are dependable. Regardless of the operating conditions if they are properly installed ANHYDREX Signal Cables will operate dependably year in and year out.

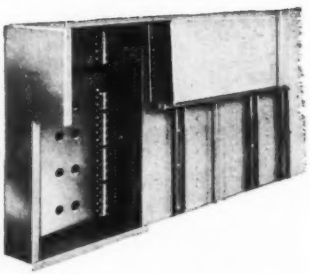
If you have a power, signal or control cable problem we will be glad to discuss it with you and make recommendations based on nearly seventy years experience.

SIMPLEX-ANHYDREX

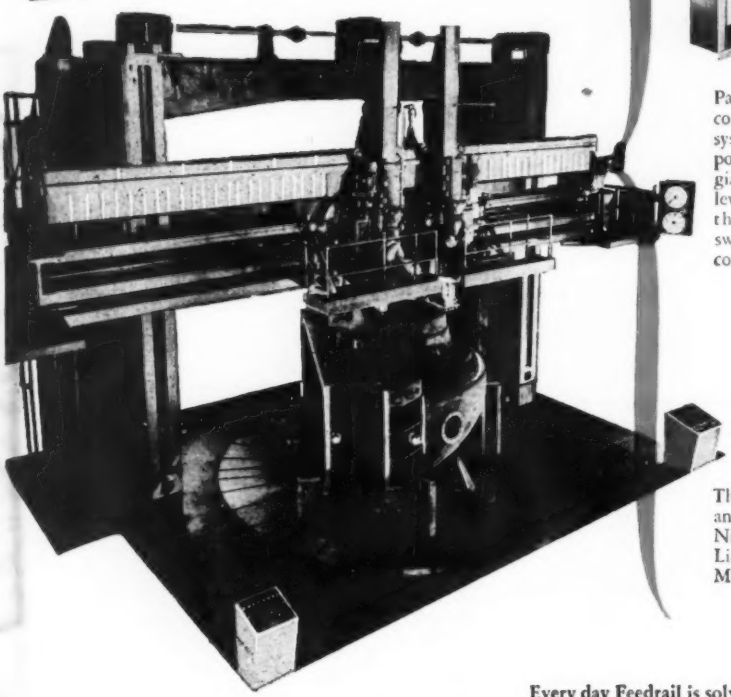
SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

ELECTRIC FEEDRAIL®

"Nerves" for a 30-ft. giant



Partial view of 79 pole, multiple conductor Feedrail trolley busway system that distributes current for power and control of this 30-ft. giant mill. Except for critical hand lever adjustments, all control is through buttons and selector switches located in remote dual console stations.



This huge thirty foot vertical boring and turning mill was built by the Niles Tool Works Div., Baldwin-Lima-Hamilton for Allis-Chalmers Mfg. Co.

Giant thirty foot boring mills are not built every day. When they are, precision control is essential. A 79 pole multiple conductor Feedrail provides the "nerve system" for finger-tip control and dependable, unfailing power supply for this massive machine.

Every day Feedrail is solving power and control problems. Moving trolley outlets in an enclosed track roll with electric tools which must follow work. Power machines move in and out of work centers quickly, and produce more work in less time. Feedrail flexibility is engineered into standardized units that assemble to give a "tailored to fit" power supply system. Write for literature.

Sold by leading electrical distributors.

46-C

Never Becomes Obsolete

ELECTRIC FEEDRAIL®

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET · NEW YORK 7, N. Y.

why accept less?

CERTIFIED BALLASTS

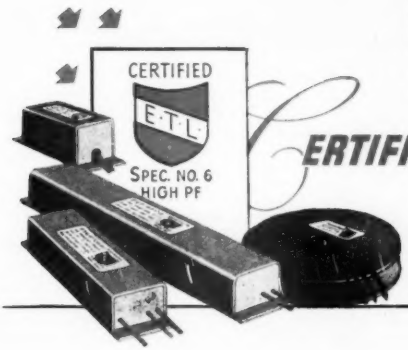
assure a full 100% life for fluorescent tubes!

Tests show that fluorescent lamps last longer when used with a CERTIFIED BALLAST than when connected with an improperly designed ballast.

CERTIFIED BALLASTS assure rated light output, quiet operation and long, satisfactory service. There's a reason for this. It is... CERTIFIED BALLASTS are made to precise specifications, then tested, checked and *certified* by Electrical Testing Laboratories, Inc.

● Complete information on the types of CERTIFIED BALLASTS available from each participating manufacturer may be obtained from Electrical Testing Laboratories, Inc., East End Avenue at 79th Street, New York, New York.

Participation in the CERTIFIED BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.



CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

2116 KEITH BLDG., CLEVELAND 15, OHIO

AMERICAN STEEL & WIRE COMPANY

USS TRADE MARK

AMERICAN ELECTRICAL WIRE AND CABLE

UNITED STATES STEEL

When it's too hot

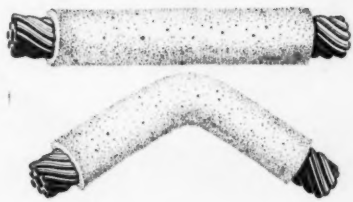
IT'S HOT IN HERE! Electric furnace cable must carry huge currents close to the destructive heat of the furnace itself. Amerbestos is a natural for this installation because 1) it can withstand the heat, and 2) the special felted asbestos construction can be continually flexed.

THESE LIGHTS, WIRED WITH AMERBESTOS, are installed under a blast furnace that often operates several months at a time without stop. Notice how the boiling slag (at 3,000°F.) has piled up on the lights. Despite the heat, this Amerbestos has never shown the slightest trace of trouble.

for everything else — use AMERBESTOS

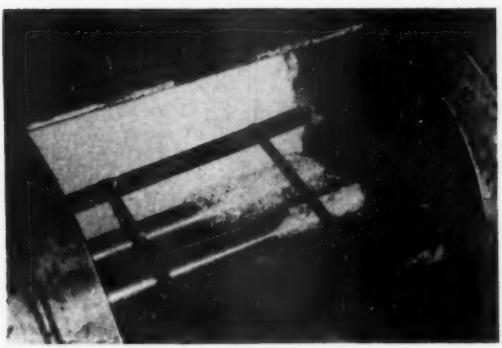
special felting process

assures more effective insulation



● Heat-Resistant Amerbestos Wire and Cable has a very special feature that you should know about. It's all in the way we apply the asbestos insulation.

Conventional heat-resistant wire and cable uses asbestos that is spun into a yarn then wrapped around the conductor. This has some serious disadvantages that you can quickly spot if you look at the drawing. When the conductor with this type of insulation is bent, the asbestos yarn is unevenly stressed. Therefore it separates at the outer radius of the bend, and all the effect of the asbestos insulation is lost at that point.



Compare this to Amerbestos. We don't use spun asbestos yarn. Instead, we actually "felt" the asbestos and apply it evenly around the conductor. As you can see from the actual production photograph, the fibres are "picked" off a rotating drum with a vibrating steel comb. Then the conductor and asbestos are slowly pulled through a closing die that compresses the fibres into a tightly packed felt that *stays put* even when bent.

This careful attention to sound construction methods has been largely responsible for the ever-growing demand for Amerbestos Wire & Cable. Plus the fact that Amerbestos is made in a *complete* range of sizes, both plain asbestos and AVC, with a wide variety of special jackets to fit every heat-resistant wire or cable requirement.

For more information, write American Steel & Wire Company, Rockefeller Building, Cleveland 13, Ohio.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO • COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

American Electrical Wire and Cable

UNITED STATES STEEL

TODAY'S FINEST FITTINGS!

TOMIC Products

Makes the job
EASIER!
SAFER!
BETTER!

Designed Right • Manufactured Right • Priced Right

DO THE BEST JOB WITH
TOMIC CABLE CONNECTORS!

PATENT NOS. 2097695 2419426

No. 100 Romex Connector for ½ K. O.

No. 200 Service Entrance and Range Connector for ¾" K. O.

SIMPLE – slips in from outside.
QUICK – installed in 10 seconds.
CONVENIENT – for securing contacts.
DEPENDABLE – can not shake loose.

On Sale at Your Wholesaler

UNDERWRITERS' LISTED

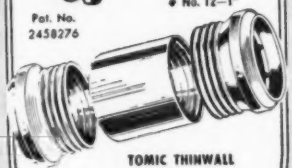
PRICED RIGHT— You Can SAVE

INSIST ON
TOMIC THINWALL CONNECTORS and COUPLINGS...

Save!

TOMIC THINWALL CONNECTORS
- No. 10—½"
- No. 11—¾"
- No. 12—1"

Pat. No. 2458276



TOMIC THINWALL COUPLINGS
- No. 310—½"
- No. 311—¾"
- No. 312—1"

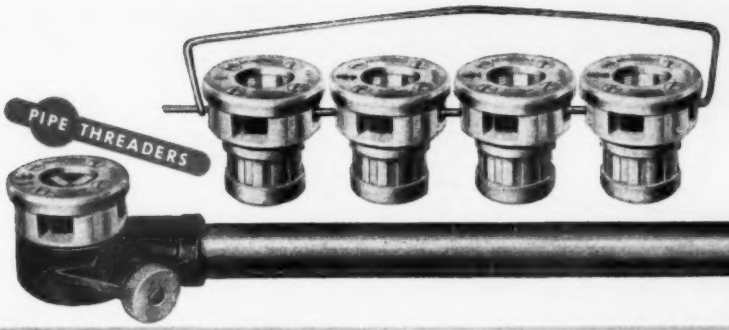
A fair trial will convince you that Tomic thinwall connectors and couplings do the job easier, safer, quicker. Try them ... and you'll never be without them. Order from your jobber.

UNDERWRITERS' LISTED

On Sale at Your Wholesaler

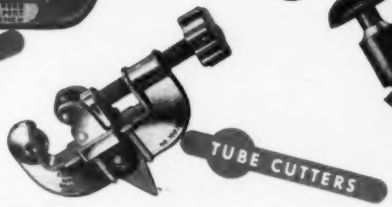
TOMIC SALES & ENGINEERING CO.

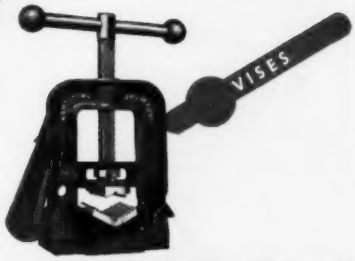
4864 Woodward Ave. · Detroit 1, Michigan



EVERY JOB GOES WELL *with* ARMSTRONG-BRIDGEPORT *Job-proved* PIPE FITTERS' TOOLS

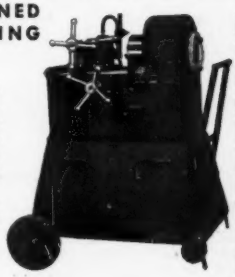
A PRODUCT OF CAPEWELL





MORE WORK IN LESS TIME AND WITH LESS EFFORT WITH THE VOSPER DESIGNED PORTABLE PIPE THREADING MACHINE

The Papoose is a 2″ heavy duty power pipe and bolt threading machine, for high speed pipe and bolt threading, cutting and reaming. It has quick opening adjustable die heads, high speed steel segments, and can cut 2″ pipe nipples 2½″ long without a nipple chuck. Portable and easy to handle, it can be wheeled right to the job.



THE CAPEWELL MANUFACTURING CO.
64 Governor Street, Hartford, Connecticut

Gentlemen: Please send me more information on

☐ Pipe Tools; ☐ Pipe Threading Machines.

NAME _____

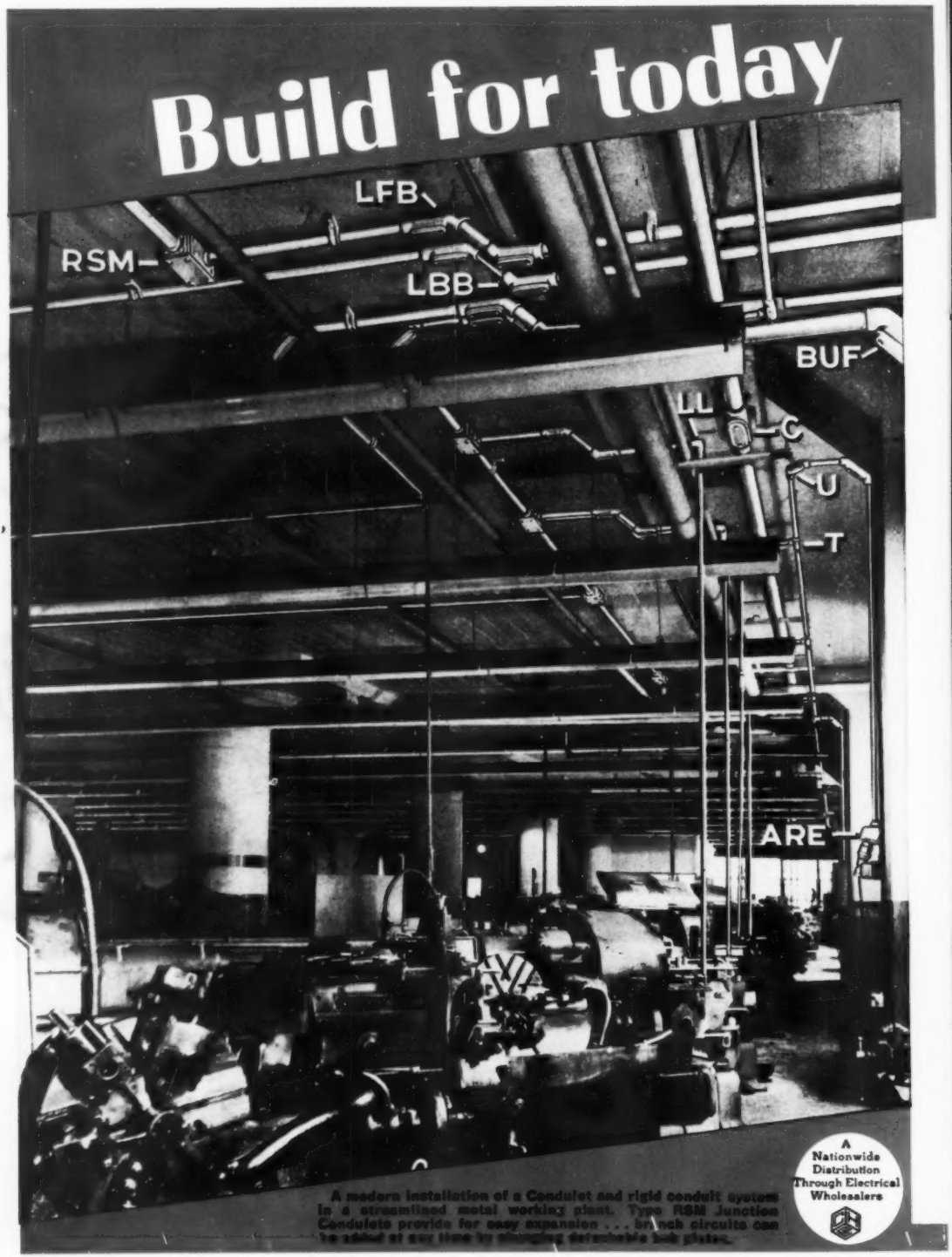
COMPANY _____

ADDRESS _____

_____

9CAS1

Build for today



A modern installation of a Condulet and rigid conduit system in a streamlined metal working plant. Type RSM Junction Condulets provide for easy expansion . . . branch circuits can be added at any time by changing detachable hub plates.

A Nationwide Distribution Through Electrical Wholesalers

... and tomorrow

A modern CONDULET* and rigid conduit installation gives you enduring protection

PLUS

the flexibility to meet tomorrow's needs

Type RSM Junction Condulets RS Series take 4 detachable hub plates with up to 3 hubs for conduit from ½" to 3½"

Type LFB Obround Condulet

Type LBB Obround Condulet

Type LL Obround Condulet

Type C Obround Condulet

Type U Obround Condulet

Type T Obround Condulet

Type BUF Mogul Condulet Mogul Series are for use where larger openings are needed for pulling large conductors

Type ARE Arktite Plug Receptacle

The most important consideration in an electrical installation is continuous plant operation through the years. Crouse-Hinds sturdy cast Feraloy CONDULETS and rigid conduit provide the best possible mechanical protection against accidental damage to electrical wiring and equipment.... prevent costly shutdowns.

Next in importance is flexibility to meet the needs of today's fast moving industry. A modern CONDULET installation provides for growth and changing conditions. CONDULETS with detachable hub plates make it easy to change circuits or add new ones at any time.

In addition to protection and flexibility, a CONDULET installation gives you these definite advantages:

- **ECONOMY.** The installed cost of Crouse-Hinds CONDULETS and rigid conduit compares favorably with other wiring methods. The added advantages make it the really economical method that pays dividends over the years.
- **SAFETY.** Ground continuity is of vital importance. CONDULETS with taper threaded hubs and rigid conduit with tapered threads make a secure joint that provides a reliable and permanent low resistance path to ground. This safety feature assures maximum protection against personal injury and fire.
- **CORROSION RESISTING.** Cast Feraloy CONDULETS give the best protection wherever moisture, dust, or corrosive atmospheres are present.
- **UNIVERSAL APPLICATION.** You can install galvanized CONDULETS and galvanized rigid conduit under all atmospheric conditions and in all occupancies.
- **QUALITY.** The trademark CONDULET stands for the highest quality, reliability, and long life.
- **VARIETY.** More than 15,000 items are listed in the CONDULET Catalog, including a complete explosion-proof and dust-tight line for use in hazardous locations.

On YOUR next electrical layout, plan to get all the benefits of sturdy cast Feraloy CONDULETS and rigid conduit . . . the universal wiring method.

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Albuquerque—Birmingham—Boston—Buffalo—Chicago—Cincinnati—Cleveland Dallas—Denver—Detroit—Houston—Indianapolis—Kansas City—Los Angeles—Milwaukee Minneapolis—New York—Philadelphia—Pittsburgh—Portland, Ore.—San Francisco Seattle—St. Louis—Washington. RESIDENT REPRESENTATIVES: Albany Atlanta—Baltimore—Charlotte—New Orleans—Richmond, Va. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

CONDULETS are made only by CROUSE-HINDS

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

as fundamental as a kitchen sink...

Architect: George R. Paul

No electrical contract is complete unless it contains provision for telephone raceways

A good plumbing contract covers everything — including the kitchen sink. A good electrical contract covers everything, too — including raceways for telephone wires. Conduit is the only sure way to protect the beauty of walls and woodwork. It's easy and inexpensive to install. And it means extra profits for you. You'll find it good business to make built-in telephone raceways a part of every job you contract.

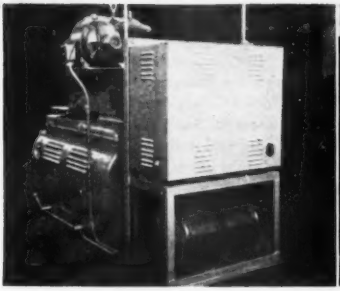
BELL TELEPHONE SYSTEM

Century SELECTIVE SPEED Drives

Permit Exact Speed Control for Increased Production • Better Quality Control

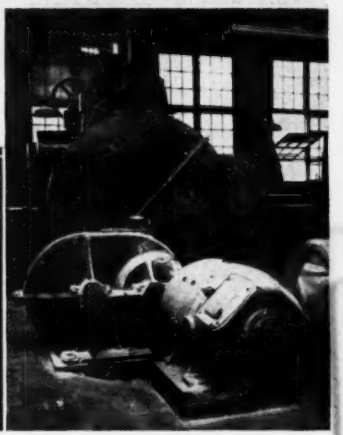
Here are a few typical applications

that demonstrate the benefits which you can get from Century Selective Speed Drives on either new equipment or your present set-up.

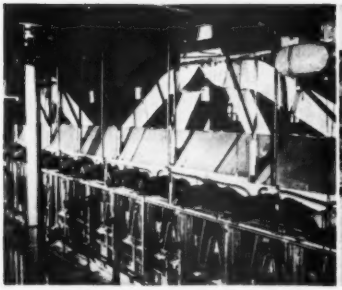


Production increased, machining quality was improved, accuracy is held closer and set-up time is reduced as a result of achieving optimum peripheral cutting speeds on this boring mill.

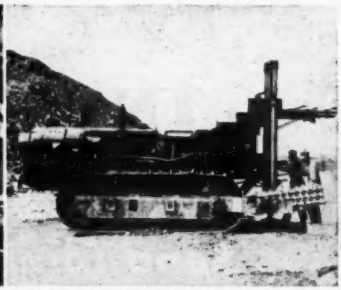
Costs are cut and scrap is reduced because maximum speeds are easily controlled for different classes of work done on this printing press. Accurate control maintains exact register of multiple copy forms.



Better quality control is maintained over production of latex threads because of the wide selection of speeds plus smooth acceleration and deceleration. Extreme flexibility permits fast change-over when a new gauge, or size, of rubber thread is to be produced. Instant stopping is also an important protective feature.



Uncoilers and coilers with pinch rolls and looping device, require a wide range of inter-related automatic sensitive speed changes. As the coils of material unwind from one spool and wind on another spool, the diameters change yet the speed through the electrolytic process must be at a constant rate.



Operating speeds are instantly controlled on this earth auger drill rig. Permits operator to change speeds according to the type of earth being drilled. Drilling is done to depths of 100 feet in strip mining.

For more details on Century Selective Speed Drives, from 1 to 150 horsepower, call the Century office nearest you. Your local Century representative can also furnish information on the complete line of Century motors, from ⅙ to 400 horsepower.

CENTURY ELECTRIC CO.

1806 Pine St. • St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

Century Electric Company is celebrating its 50th year in the electrical industry

FOR PROTECTION

AGAINST DUST, DIRT, ABRASIVES, STEAM, FUMES, ETC.

New Fairbanks-Morse Type QZE, Frame 284 Motor. Also available in smaller frame sizes.

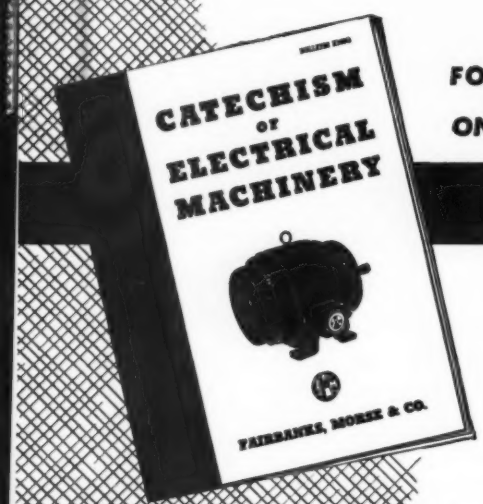
FAIRBANKS-MORSE

Totally Enclosed, Non-Ventilated Motors

For the toughest operating conditions, here is the newest development in totally enclosed, non-ventilated motors. Fairbanks-Morse Type QZE Motors are now available in Frame 284—delivering 7½ hp. at 1800 r.p.m., 5 hp. at 1200 r.p.m—filling a long-standing need for this type and size of motor. New features that assure cool, long-running service include a unique end-bell construction with cooling fins for efficient heat dissipation — and for safe, uniform, internal temperatures. For the full story on the new dependability this class of QZE Motors can bring to your most severe motor jobs, ask your Fairbanks-Morse motor representative or write Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago 5, Illinois.

FAIRBANKS

A NAME WORTH



FOR INFORMATION

ON DESIGN AND USE OF ELECTRIC MOTORS

Send for This Manual!

In this popular "Catechism of Electrical Machinery," you'll find an invaluable fund of basic information on the design, performance and proper use of the common types of alternating and direct current motors and generators. Primarily intended for training those who are not too familiar with electrical phenomena or terminology, it has been widely accepted by engineers, designers, and others as an aid in instruction of new men. It can be especially useful now, during this period of expanding and shifting employee rolls. Write your nearest Fairbanks-Morse Sales Center for your copy.

FOR SATISFACTION

IN SERVICES THAT ARE ROUGH ON MOTORS!

Compare these features

Superior Electrical and Mechanical Construction In All Fairbanks-Morse Type QZE Motors

Completely Protected Windings — No ventilating openings: impossible for any foreign matter to come in contact with windings.

Easy to install — NEMA standard mountings, interchangeable with standard, open-type motors of same ratings.

Grease lubricated ball bearings — permit sealing for the life of the bearing if desired.

Heat transfer air circulation — continuous circulation of captive air inside frame structure assured by rotor fans.

Convenient lubrication — protective covers or other parts need not be removed.

Reversible recessed conduit box — symmetrical construction allows easy reversal of stator frame.

COPPERSPUN ROTOR an Added Advantage

All Fairbanks-Morse Type QZE totally enclosed, non-ventilated motors offer the Fairbanks-Morse Copperspun rotor whose one-piece, virtually indestructible design and excellent electrical characteristics assure longer, more trouble-free life.

-MORSE

REMEMBERING

THESE ARE YOUR FAIRBANKS-MORSE SALES CENTERS

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EAst 0131

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CHestnut 7483

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Cables run COOLER... in TRANSITE DUCTS

... reducing copper losses

... increasing current capacity

... prolonging insulation life

HERE'S HOW to reduce copper losses ... increase current carrying capacity ... and prolong insulation life—run your cables in Transite* Ducts.

Current carrying capacities can be increased in a typical duct bank as much as 5%, or I^2R losses can be reduced 11%, for cables located in Transite as compared with other ducts used for power circuits.

And, Transite Ducts assure permanent duct banks because Transite is incombustible; is immune to rust and rot; is unaffected by electrolysis; will not slag under action of an arc, and will retain its high original strength.

An unusually smooth bore assures no injury to cable sheath, either in natural movement under load, or when pulling-in cables. Long, lightweight lengths can be quickly and economically installed.

In addition, a full line of fittings simplifies even the most complicated of installations.

For full information on Transite Ducts, write for Data Book DS-410. Johns-Manville, Box 290, New York 16, N. Y.

*Reg. U. S. Pat. Off.

How Transite Ducts increase current carrying capacities

Type cable 3 cdr. 500 MCM Compack Sector, 15 KV (6th Edition AEIC Spec.)
No. of cables—3 (all loaded in one bank)
Daily Load Factor—75%
Earth Temp. ambient—20 C

	Transite	Other
Total Therm. Res. to Dielectric Loss (C watts/ft.)	5.66	6.17
Total Therm. Res. to Copper Loss (C watts/ft.)	4.44	4.95
Temp. Rise from Dielectric Loss (C)	1.9	2.1
Allowable Rise for Copper Loss (C)	59.1	58.9
Allowable Watts per ft. cable	4.44	3.96
Allowable Current—(Amps. per cdr.)	386.	365.
Allowable Current—(Relative %)	105.6	100.

Johns-Manville *Transite Ducts* **"KORDUCT"— for encasement in concrete**

"CONDUIT"— for use exposed and underground without encasement

GOULD

Plus-Performance Plan

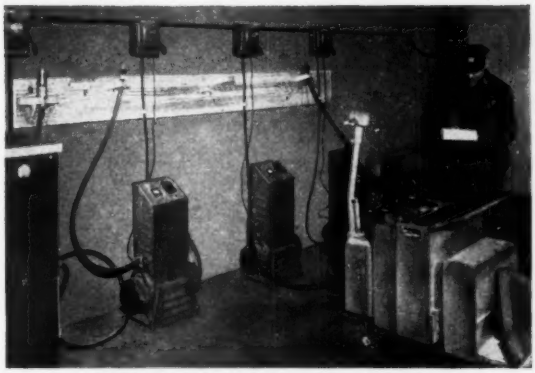
. . . SHOWS YOU HOW

CORRECT CHARGING

EXTENDS BATTERY PERFORMANCE!

Right now, the problem of conserving and extending essential battery power is urgent. Timely help is offered you by the GOULD PLUS-PERFORMANCE PLAN which can improve battery performance as much as 50%! Here is a complete system of manuals, articles, specifications, bulletins, record cards and charts which explains and illustrates how to select, charge and handle, maintain and determine the condition of your batteries.

The material comprising the GOULD PLUS-PERFORMANCE PLAN is available to battery users without obligation. A request on your letterhead will bring descriptive literature by return mail.



Charging rooms should be planned to make charging and handling convenient and economical.

FOUR SIMPLE CHARGING RULES SAVE POWER

1. Do not overcharge. Use 22.5 amperes per 100 ampere-hours of battery capacity for 80% of charging time. Finish charge at 5 amperes per 100 ampere-hours. Correct charging will not cause gassing or overheating.
2. Give periodic equalizing charges. An extra 4-hour charge at the recommended finish rate at least once a month but not more often than once a week makes sure all cells are up to full charge.
3. Keep idle batteries charged. Batteries not in use should be given a freshening charge once every three months to prevent internal discharge, sulphating and eventual loss of efficiency.
4. Inspect charging equipment regularly. Make sure it is set correctly for the size of batteries to be charged. Inspect voltage relay timers frequently to assure accurate automatic cut-off. If ampere-hour method is used, check ampere-hour meter charts for correct settings.

The Gould "Thirty" with "Z" Plates—America's Finest Industrial Truck Battery

GOULD STORAGE BATTERIES

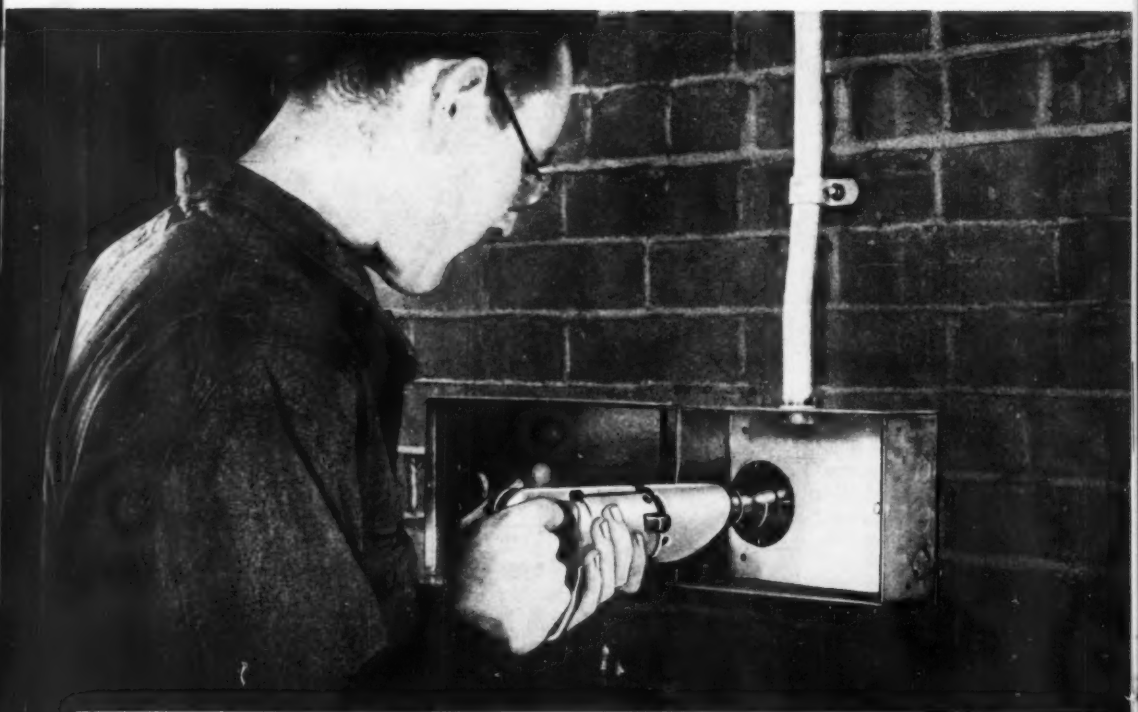
GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries

Announcing

REMINGTON

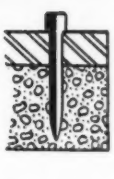
New cartridge-powered tool concrete or steel in one



It's fast and easy to operate The Remington Stud Driver

Simply hand-assemble stud and power cartridge, load as a unit in easy-to-open Remington Stud Driver, and close.

Then press loaded Stud Driver firmly against working surface, depress safety button, and pull trigger.



Explosive charge imbeds stud solidly. Open Stud Driver with a twist of the wrist, eject empty shell, load next stud. Whole job takes seconds!

"If It's Remington, It's Right!"

Remington

DUPONT

MODEL 450

STUD DRIVER

fastens steel or wood to *lightning-fast* operation

LOOK AT ALL THESE FEATURES

COMPACT AND PORTABLE. Weighs only 5½ pounds, ideal for scaffold, ladder and overhead work. Comfortable to use in any position, perfect for inaccessible places.

SPEED. One man can set up to 5 studs in a minute. Entire mechanism designed for speed, from loading to pulling the trigger to ejection of shell. Stud is set at whatever depth is required—up to 2¾ inches, depending on material.

ELIMINATES INVESTMENT IN OUTSIDE POWER. Operator has all the equipment needed right in his hand. Excellent for use in isolated areas.

TRIPLE SAFE. Remington Stud Driver has plainly visible red dot indicator (A) to show when it's cocked, safety (B) that must be depressed before and during squeezing of main trigger, and permanently attached safety shield (C) that must be compressed against work before the Stud Driver will operate. Trigger is well protected, cannot be tripped accidentally. Has only slight recoil and low noise level.

WIDE VARIETY OF STUDS are available for every fastening job—every stud trade-marked for the user's protection. Pull-out resistance as high as two tons in good concrete, depending on the stud used. Cartridges are available in 5 different power loads, covering all possible fastening requirements—any stud instantly assembled with any cartridge.

RUGGED. All working parts of the Stud Driver are made of heat-treated alloy steels, housing of strong, lightweight aluminum that carries no operating stress. Lining of safety shield is a solid block of tough, resilient Du Pont neoprene.

PRICE for Model 450 Remington Stud Driver—only $119.50—complete in rugged steel carrying case. Initial production and distribution may not keep pace with demand, but every effort will be made to fill orders as promptly as possible.

Sets fastening studs as fast as 5 per minute...needs no outside power source

Here's a tool that can truly revolutionize your construction fastening methods—speed jobs and cut costs. In a matter of seconds, the Remington Stud Driver firmly fastens steel or wood structural pieces and fittings to concrete or steel surfaces. It's as much as 100 times faster than methods now widely used. And this simple tool does the entire job...requires no outside power source or equipment. It's compact, portable, rugged...and safe.

Proved by exhaustive tests to be the finest fastening system ever devised, the Remington Stud Driver is made by Remington Arms Company, Inc., America's oldest and foremost gunmakers. To obtain detailed information on this time- and money-saving tool, and for the name of your nearest distributor, fill out and mail the coupon below.

Remington Arms Company, Inc.
Industrial Tool Division
938 Barnum Ave., Bridgeport 2, Conn.

I am interested in obtaining detailed information on the Remington Stud Driver Model 450.

*Name*_____

*Firm*_____

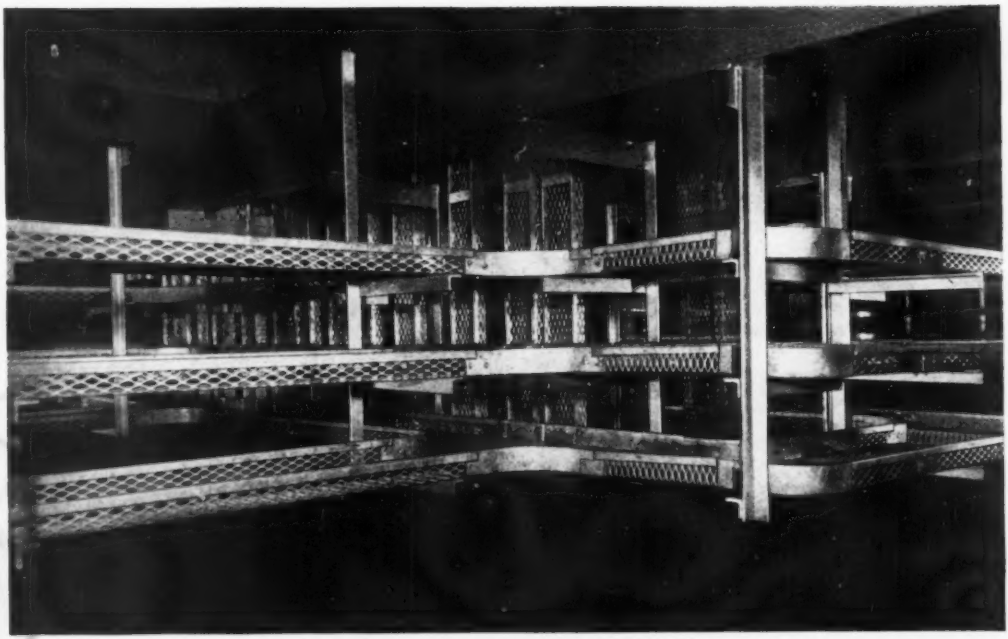
*Position*_____

*Address*_____

*City*_____ *State*_____

ALL THESE JOBS...AND MANY MORE!

1. **Hanging steel sash and door bucks to concrete and brick.**
2. **Anchoring wood plates to concrete floors and ceilings for setting partitions.**
3. **Fastening wood furring strips to concrete for attachment of metal lath.**
4. **Anchoring suspended ceilings, hangers, sprinkler systems and lighting fixtures to concrete.**
5. **Attaching conduit and panel boxes to steel and masonry.**
6. **Anchoring light machinery to concrete pads.**
7. **Erection of signs, awnings and blinds on steel or masonry.**
8. **Hanging radiator housings to concrete or brick.**
9. **Fastening soil pipe hangers to concrete.**
10. **Fastening 2 x 4's to steel structurals.**



The NEW Cope Cable Trough Enables You To CUTS COSTS UP TO 66⅔%

An outstanding utility company reports that on a large job their installation of Cope Cable Trough saved them 66⅔% of the cost of a conduit installation!

Savings are always made when Cope Cable Trough is used—real savings in material, labor and costs.

Such savings are not only necessary at all times, but doubly so during our Country's State of Emergency.

In most cases Design Engineers can order standard Cope Cable Trough and Fittings for a complete installation job, but in cases where special fittings are required they have Cope Engineers to help solve their problems. The elimination of costly engineering—the ease of installation—man-hour reduction—all of these factors reduce costs and increase savings through the use of Cope Cable Trough.

If you want to save—and you *will* save—write now for the detailed bulletin on Cope Cable Trough.

You know Cope by these Products . . .

T.J. Cope INC.

T. J. COPE, INC., 711 SOUTH 50th ST.
PHILADELPHIA 43, PENNSYLVANIA

Blows itself clean as a Whistle!

DIRT IS CARRIED AWAY by cooling air blown over the ribbed cast iron frame and bearing housings of this new Allis-Chalmers tefc motor. That means less motor cleaning . . . inspection . . . overhaul!

Concealed air passages and pockets have been eliminated. Dirt can't build up to cause overheating. And as for oily dirt that sticks — just wipe or blow it off.

Studies show that on most applications, totally-enclosed fan-cooled motors more than pay back their extra cost in reduced maintenance. And this new Allis-Chalmers Type APZ tefc motor makes maintenance costs lower than ever before.

Rigid Construction

The frame is cast iron which has high resistance against corrosion and distortion. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZ totally-enclosed fan-cooled motor is built in all NEMA standard frame sizes from 224* to 505. Also in explosion-proof type. Your A-C Authorized Distributor or District Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.

A-3427

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

Texrope and Vari-Pitch are Allis-Chalmers trademarks.

ALLIS-CHALMERS

*Similar design non-ventilated motors Type APK, also available in frames 203 to 224 inclusive.

Love letters to a lamp!

the GUTH 4-ft. SLIMLINE

"Here's to GUTH 4-ft. Slimlines! They're more profitable to handle and easier to store than the long 8-ft. fixtures . . . and I have far less loss from breakage."

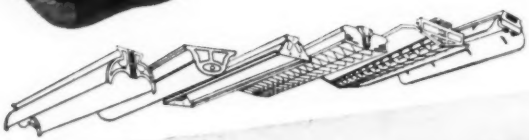
Lighting Wholesaler
Pittsburgh, Pa.

"I feel safer about specifying GUTH 4-ft. Slimlines. No more complaints from my clients because of the long, unwieldy 8-ft. lengths. Takes 50% less manpower to install and maintain."

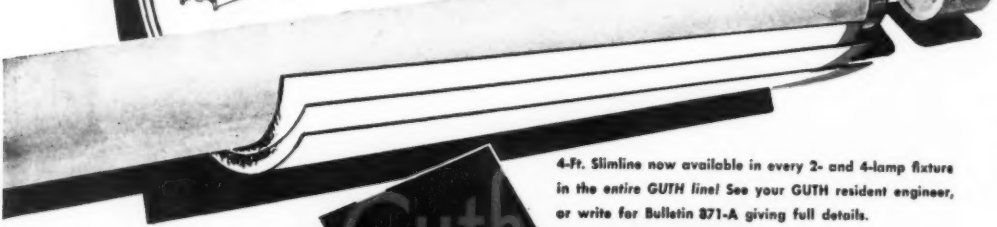
Lighting Engineer
St. Petersburg, Fla.

"My clients are still praising me for suggesting convenient, short GUTH 4-ft. Slimlines. Gives them all the economy and functional advantage of Slimline lighting without the clumsy 8-ft. length."

Architect
Los Angeles, Cal.



Last year we started out with both 4- and 8-ft. slimline — and 4-ft. has won by a landslide! Sales have zoomed higher than anyone had expected. Lighting men everywhere have fallen in love with GUTH 4-ft. Slimline. Here's what some say:



4-Ft. Slimline now available in every 2- and 4-lamp fixture in the *entire GUTH line!* See your GUTH resident engineer, or write for Bulletin 871-A giving full details.

LIGHTING

THE EDWIN F. GUTH COMPANY • ST. LOUIS 3, MISSOURI

Leaders in Lighting since 1902

These conduit problems would have been tough—

except for SEALTITE

There seem to be few limits to Sealtite's* usefulness. It's used for wiring between moving parts, to absorb vibration, for cramped connections. It protects wiring against oil and grease, moisture, chemicals and impact on machine tools, in processing plants and in temporary installations.

Your electrical supply house carries Sealtite in stock. Or if you would like more information about this versatile, flexible conduit, write to The American Brass Company, American Metal Hose Branch, Waterbury 20, Conn. In Canada: The Canadian Fairbanks-Morse Co., Ltd.

51226

*Trademark

Today the police car without a radio stands little chance of intercepting the crook. But the radio is in the back; the controls and generator are up in front; and the wiring to connect them must run underneath the car. On this car, operated by a large metropolitan police department, the problem of protecting that wiring from dirt and water, road chemicals and impact is simply solved by running it in Sealtite—the flexible, tough, liquid-tight conduit.

for **flexible, liquid-tight** electrical conduit . . . specify **SEALTITE**

AN ANACONDA® PRODUCT

Life in a subway presents some difficulties — and one of them could be the final conduit connector to these fluorescent lighting fixtures in a station on New York's Eighth Avenue Subway line. Sealtite Flexible Conduit makes the installation simple. Its flexibility makes the short radius bend, permits the fixtures to be removed without removing conduit; and Sealtite's tough steel core plus a liquid-tight synthetic jacket protects the wiring against moisture.

You can't buy Better Fittings or ones that cost less to use

Cross Section Showing Indentations.

Quicker to use and neater in appearance, Briegel All-Steel Indenter Fittings not only make stronger connections but also make each job more profitable to the contractor and satisfactory to his customers.

Two Easy Squeezes and they're set to stay. It is only natural that the Briegel All-Steel Indenter Fittings are the most widely used E.M.T. connectors and couplings. Contractors the world over recognize their cost cutting qualities and the fact that they make each wiring job neater, stronger and better.

All B-M Fittings Carry the Underwriters Seal of Approval

BRIEGEL METHOD TOOL CO.

GALVA, • ILLINOIS

DISTRIBUTED BY

The M. B. Austin Co., Northbrook, Ill.; Clayton Mark & Co., Evanston, Ill.; Clifton Conduit Co., Jersey City, N. J.; General Electric Co., Bridgeport, Conn.; The Steelduct Co., Youngstown, Ohio; Enameled Metals, Pittsburgh, Penn.; Kondu Mfg. Co., Ltd., Preston, Ont.; Wagner Malleable Products Co., Decatur, Ill.

"Costs CUT 44%"

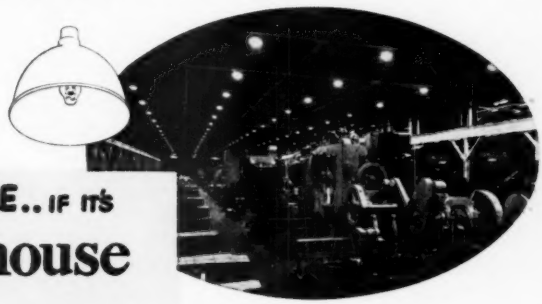
with Westinghouse MERCURY lighting

A typical customer's problem: "To provide high illumination levels at a reduced operating cost."

Westinghouse recommendation: "To change from incandescent to Westinghouse Mercury Lighting."

Results: "36 fewer fixtures to maintain; 216 fewer lamps to replace; *a total reduction of 44 % in annual operating cost.*"

This is only one case out of hundreds of "time-tested" installations. All show evidence that Westinghouse Mercury-Vapor Lighting is a fast-growing industry favorite. Investigate the complete line: 400, 1000 and 3000-watt units for either low or high-bay areas . . . open or closed fixtures for clean or dirty locations... high or low-voltage ballasts for any distribution system. Send for B-4727, **"Westinghouse Lighting at Work" in every industrial area.** Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.



YOU CAN BE **SURE**.. IF IT'S

Westinghouse

LIGHTING DIVISION

Edgewater Park, Cleveland

J-04293

Complete...from A to Ezra!

YES, SIR, Gedney makes a *complete* line . . . a fitting that's exactly right for every job.

What's more, Gedney fittings are made *completely* in Gedney's foundry and machine shop. Every manufacturing step is under continuous, positive control. Accurate machining and precision threading are assured. Gedney fittings are unbreakable MALLEABLE IRON and hot dip galvanized by a special process.

It's no wonder, then, that each and every Gedney fitting gives *complete* satisfaction. Be sure to specify Gedney on your next order. You'll get lasting dependability . . . at the same time you'll be slashing installation time and costs.

GEDNEY
ELECTRIC COMPANY

GEDNEY

RKO BLDG. • RADIO CITY • NEW YORK 20
Foundry, Factory and Shipping Point: Terryville, Conn.

FOR LIGHTING TODAY
... and Tomorrow Too!

RLM
ELECTRICAL TESTING LABORATORIES, INC.

PHILITE

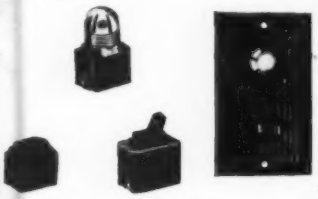
Ruby-Philite Corp.
32-02 Queens Blvd., Long Island City 1, N. Y.

You Need This New Ruby-Philite Catalog of RLM Industrial Lighting Fixtures

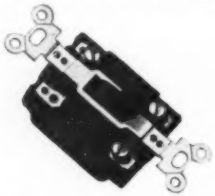
SEND FOR IT TODAY!

SOME WIRING COST-CUTTERS

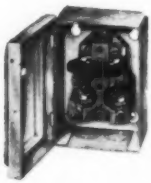
BACK-WIRED DUPLEX outlet accepts all appliances. Back-wiring cuts installation time, gives positive connection every time.



INTERCHANGEABLE LINE affords numerous attractive gangs. Simplifies wiring and saves material. A complete assortment of plates, outlets, switches, bell pushes and others is available.



NEW BACK- OR TOP-WIRED switch is quick and easy to put in. No wire bending or looping necessary. All connections positive.



ENCLOSED SWITCHES, pull-out or front-operated types. Positive acting mechanisms for utmost safety. Quality units in quality enclosures.

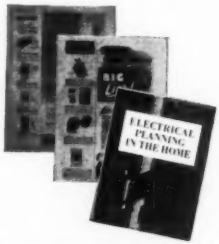
H&H *Quality* WIRING DEVICES

Labor-saving is of prime importance to the contractor today. Yet the reputable contractor will never sacrifice *quality* in order to cut labor costs.

Our broad line of modern, dependable, service-proved wiring devices meets both conditions. Every unit is designed to help you do a *better* wiring job *faster*, and easy installation is part of every switch, plug, socket, receptacle or outlet we manufacture. When you inspect one of our wiring devices you'll notice a good many new features, evidence of improved design and performance. As far as quality goes — and that's a long way — our name has been synonymous with quality for 60 years. A careful look at any of our products will assure you that you're building with the best.

So promote adequate wiring, and these — *quality* wiring devices that do a *better* job *faster*, on every job.

Through messages like these, we're reminding architects of the importance of adequate wiring and wiring devices to everyone in the building field.



Branches in: Boston, Chicago, Dallas, Denver, Detroit, Los Angeles, New York, Philadelphia, San Francisco, Syracuse.

In Canada: Arrow-Hart & Hegeman (Canada) Ltd., Mt. Dennis, Toronto.

For more information, write today to: 170° Laurel Street, Hartford 6, Conn.

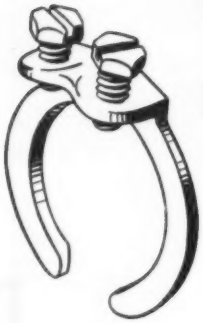
HART H & H HEGEMAN DIVISION

WIRING DEVICES

ENCLOSED SWITCHES

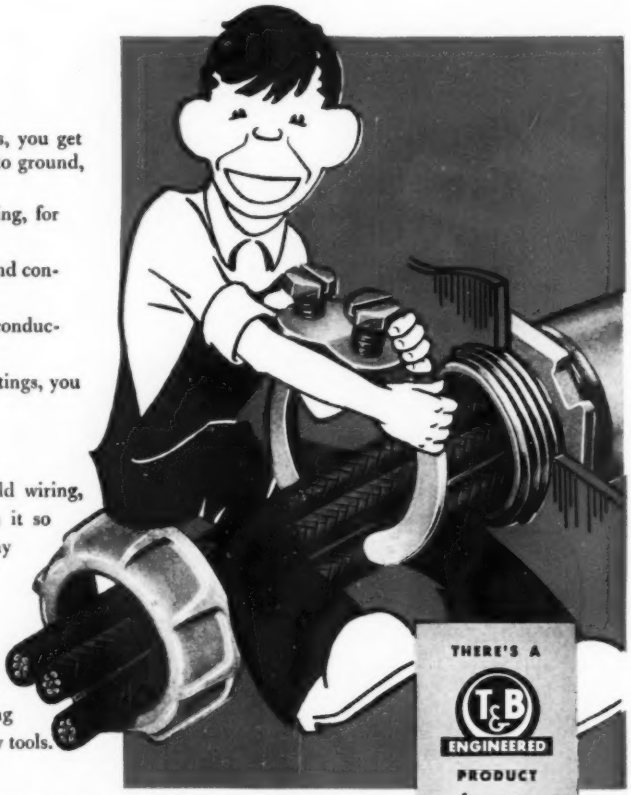
THE ARROW-HART & HEGEMAN ELECTRIC COMPANY
HARTFORD, CONNECTICUT

SPANG
CENTRAL'S
BIG 4
★ Easy to Fish Through
★ Smooth-bending
★ Easy to Cut and Thread
★ Underwriters' Laboratories and National Electrical Code approved . . .
SPANG-CHALFANT
PITTSBURGH, PA.
CENTRAL ELECTRICAL METALLIC TUBING
CENTRAL BLACK
CENLACO (HOT DIPPED)
UNDERWRITERS' LABORATORIES, INC INSPECTED RIGID STEEL CONDUIT
CENTRAL SPANG CONDUIT
SPANG-CHALFANT
Division of The National Supply Company
GENERAL SALES OFFICE GRANT BUILDING
PITTSBURGH 30, PA.
Spang-Central's Big 4 Conduit family. . . "Cenlaco". . . "Central Black". . . "Central White". . . and "Central EMT". . . provide you with a complete choice of conduit to fit any requirements. Dependable Spang-Central Conduit is sold through prominent recognized distributors.



Make APPROVED box-to-conduit grounds this LOW-COST way

Just slip a T & B Grounding Wedge over the wires—and clamp it in place quickly . . . easily . . . lastingly



HERE'S WHAT YOU GET

With these T & B Grounding Wedges, you get *triple* assurance of continuity bonding to ground, because . . .

1. Bonding screw bites firmly into bushing, for a tight wedge and a lasting bond
2. Flange fits snugly between box wall and conduit threads
3. Springy bronze body maintains high-conductivity path to ground.

And with these universally approved fittings, you get quick inspection OK's.

HERE'S HOW YOU SAVE

You can slip the wedge right over old wiring, without disturbing it at all. You turn it so screws are easy to tighten. You do away with inside lock-nuts—and most of the time, with bonding jumpers too. (If you do need a jumper, just connect it to the bonding screw.) You convert standard bushings, of all conduit sizes, to approved grounding bushings in a few seconds, with ordinary tools.

THERE'S A T&B ENGINEERED PRODUCT for every wiring job in the complete T & B line of fittings for all conductors and raceways.

UL

ENGINEERED RIGHT . . . DISTRIBUTED RIGHT! Grounding Wedges are typical of the many T & B quality fittings recently re-designed to give you outstanding performance at lowest installed costs. Like all T & B fittings, they're furnished under the T & B Plan 100% through your local T & B distributor. For further information or samples, see your local T & B distributor, or write us.

THE THOMAS & BETTS CO.

INCORPORATED

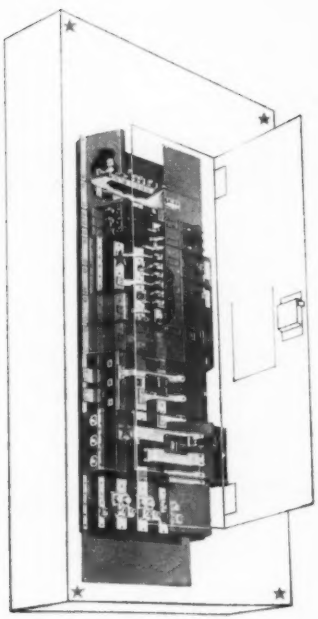
34 Butler Street

Elizabeth 1, New Jersey

MANUFACTURERS OF ELECTRICAL FITTINGS SINCE 1898

PRODUCTION CHANGE-OVER TIME WON'T MELT AWAY WITH...

Screwdriver Convertibility



Outmoded circuit protection and slow change-over can inflict double penalty on production schedules today.

It's easy to make necessary circuit changes on the job with Westinghouse Circuit Breaker Panelboards—safely, quickly.

First, indicating trim clamps make it easy to get the trim off. Since change-over parts are die-dentical, a precise fit is insured. Pretapped busbars and back pans eliminate any necessity for drilling, tapping or machining.

Screw driver convertibility is a feature of the big Westinghouse Nofuze® Convertible Distribution Panelboard, but is also available in all Westinghouse "De-ion®" Panelboards.

For complete information call your Westinghouse representative, or write for DB-30-930 containing complete data on Westinghouse Lighting and Distribution Panelboards, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna.

J-93467

YOU CAN BE SURE.. IF IT'S

Westinghouse

PANELBOARDS

Conserve Critical Copper and Steel

WITH Hi I ROCKBES[illegible]A.V.C.®

...Your best buy

YOU USE 37% LESS COPPER—30% LESS STEEL

For a 430 ampere load, 3ø, 3 wire, 40°C Ambient, 100' run—NEC chapter X

		TYPE RH	TYPE A.V.C.	
CONDUIT	SIZE	4 inch	3 inch	A saving of 327 lbs. of steel
	WEIGHT	1089 lbs./100'	762 lbs./100'	
CABLE	SIZE	500 MCM	500 MCM	A saving of 277.8 lbs. of copper
	WEIGHT	741 lbs./100'	463.2 lbs./100'	

Write for booklet "Rx for a Building with Hardening of the Arteries."

Hi $I=\frac{E}{R}$

...Your best buy

ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN 4, CONNECTICUT

Chicago, Detroit, Pittsburgh, St. Louis, Cleveland, New York, New Orleans, Los Angeles, Oakland, Calif.

Rely on Quality

INDUSTRIAL

PYLE-NATIONAL LIGHTING FIXTURES

for longer service life, added Safety and Efficiency

EXPLOSION-PROOF

Pyle-National LE Series (Class 1, Groups C and D)

For use in locations where highly flammable materials are manufactured or handled.

Rugged, flame-tight cast aluminum alloy housings render internal explosions harmless, and insure safe operating temperatures. Threaded construction permits easy access to interior for wiring and lamp replacement. Available in many types and sizes.

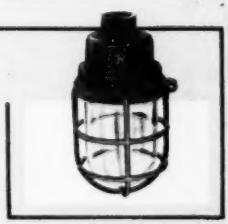
DUST-TIGHT

Pyle-National DE Series (Class II, Group E, F, G and Class III)

For use in locations where flammable dusts are present in quantity.

Strong, one-piece cast aluminum alloy housings are designed to exclude dust from the interior and to avoid accumulation of dust on the exterior surface. Available in many types and sizes.

VAPOR-TIGHT



Pyle-National BO Series

For use in any outdoor or indoor location subjected to heavy concentrations of non-flammable vapors, gases, dusts, or moisture.

Heavy duty construction and especially efficient sealing features insures an exceptionally long service life. Full line for 10 to 200 watt lamps.

VAPOR-TIGHT SIGNAL OR PILOT LIGHTS

Midget Fixtures for 10 watt Lamps.

ENCLOSED FLOODLIGHTS

Sealed against moisture and dirt, constructed throughout of cast aluminum and other rugged, corrosion-proof materials, Pyle-National floodlights retain their original high-efficiency output throughout an exceptionally long service life, with negligible maintenance and replacement expense.

WEATHER-PROOF RAIN-TIGHT

SINCE 1897

THE PYLE-NATIONAL COMPANY

1344 N. KOSTNER AVENUE • CHICAGO 51, ILLINOIS

District Office and Representatives in Principal Cities of the United States. Export Department: International Railways Supply Co., 30 Church St., New York. Canadian Agent: The Holden Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver.

CONDUIT FITTINGS • PLUGS AND RECEPTACLES • TURBO-GENERATORS • GYRALITES • MULTI-VENT AIR DISTRIBUTION

ELECTRO cuts 1 man out of 2 from your installation picture!

- Exclusively ELECTRO'S . . . the patented ONE-MAN SPEEDY HANGER
- Enables 1 man to install ELECTRO flourescent luminaires
- Saves thousands of costly man hours
- Simple and positive in operation
- Drastically reduced maintenance costs

3 EASY STEPS

STEP 1

Knock Speedy Hanger to outlet box for surface mounting . . . or twin stem set for pendant mounting. Remove knockouts; pull wire leads through.

STEP 2

Hook fixture suspension clips on to tabs on Speedy Hanger, and make wire splice.

STEP 3

Depress spring-tension pins and roll fixture into Speedy Hanger slots. Lift fixture into position. Attach 2 wing nuts.

—THAT'S ALL!

"SPEEDY HANGER SAVES MAN HOURS"

Says Daniel Hirsh

Hirsh Electric Company, Houston, Texas

"We have installed a large number of Electro fixtures and our records show a very substantial savings in man hours due to the Speedy Hanger. We find that the speed of installation and the unusual beauty and efficiency of the fixtures impress our men as well as our customer."

ELECTRO MANUFACTURING CORPORATION

2000 W. Fulton St. • Chicago 12

HEINEMANN
MAGNETIC CIRCUIT BREAKERS

help Western Electric salvage millions of feet of drop wire per year!

The HEINEMANN *Fully Magnetic* CIRCUIT BREAKER shown above is absolutely dependable at all times, regardless of surrounding temperatures. As demanded in this installation, the breaker trips *INSTANTLY* on overload (where needed, a magnetic-hydraulic Time Delay can be furnished to retard tripping for a predetermined time). Rotation of the high speed latch releases contacts which are under heavy spring pressure, while magnetic blow-out action gives instant arc interruption.

Write for

Bulletins 3200 and 1010

HOW IT WORKS

Used for salvaging short lengths of drop wire, this machine makes unique use of the HEINEMANN *Fully Magnetic* CIRCUIT BREAKER. When the mold is closed and the temperature reaches the vulcanizing heat, a thermoswitch located in the lower mold closes and throws into the circuit a resistance, which is in parallel with the heaters. This reduction in resistance increases the current so that it exceeds the rated value of the circuit breaker. The Heinemann breaker then opens, permanently disconnects the current to the elements, and extinguishes a red light which is used to visually indicate the heat period. The magnetic breaker, which is equipped with auxiliary contacts, then acting as a single pole-double throw switch, transfers the current to the timer which through a relay operates a white light that remains illuminated for the entire cure period. At the end of the cure period the relay opens and the light goes out.

EST. HECO 1888

HEINEMANN ELECTRIC COMPANY

132 PLUM STREET **TRENTON, NEW JERSEY**

Cutler-Hammer's answer to the unavoidable internal heating that causes Safety Switches to fail.

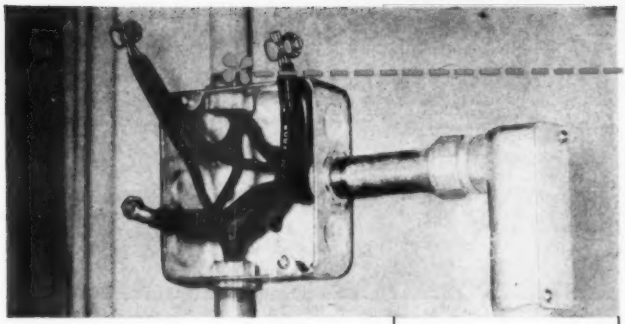
Engineering research authenticated by outstanding authorities has conclusively established "internal heating" to be the principal cause of safety switch failures. This "internal heating" literally bakes the life right out of safety switch parts, causing insulating materials to disintegrate and metal parts to distort and corrode. The safety switch then either becomes inoperative or it "burns up" through inability to carry the load.

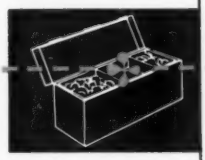
In properly constructed safety switches, fuses are almost entirely responsible for this destructive "internal heating." This is not a criticism of fuses for *any* fuse operating up to its rated load *must* be near its melting point if it is to perform properly when an overload occurs. And any metal operating *near* its melting point *must* be hot . . . and fuse links are *hot* . . . with temperatures running as high as 700 degrees Fahrenheit.

Since you cannot vent trapped heated air through a safety switch enclosure and still keep a safety switch safe, the only escape from the ravages of "internal heating" *must* come through the selection of materials for the internal safety switch structure and the design of that structure to *withstand successfully the unavoidable heat conditions met in safety switch service.*

Cutler-Hammer Safety Switches were completely redesigned in this way *a dozen years ago* to beat "internal heating" when engineering research clearly indicated the need for *such* safety switches. Eleven years of experience shows the Cutler-Hammer claim of better safety switch performance far more than a mere promise; it is a proven *fact* that demonstrates why there can be no other answer in safety switch selection. CUTLER-HAMMER, Inc., 1306 St. Paul Avenue, Milwaukee 1, Wisconsin.

CUTLER-HAMMER
SAFETY SWITCHES
C-H





here's a connector that lives a DOUBLE LIFE!

Burndy connectors are strongly constructed of high-grade, non-corroding alloy with husky, sharp, uniform threads. That's why you can use Burndy connectors over and over again for *temporary* or *permanent* installations. Today, it's most important to conserve stock. Make your supply go further, save time, reduce costs and be sure of sound connections: *use* Burndy connectors... *re-use* Burndy connectors!

BURNDY CONNECTORS

BURNDY, New York 54, N. Y. • Western Branch: Vernon 58, Cal. • Burndy Canada Ltd., Tor. 8, Ont.

And now . .

. . . a New Type Bar-Set

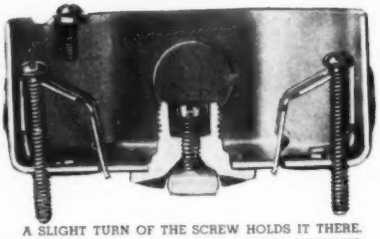
The box that can't swivel on the bar

for Speedy Installations and BETTER JOBS

NOTE THESE TWO EXCLUSIVE FEATURES

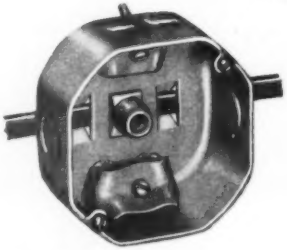
The Straps That Are Part of the Box -:- The New Malleable Iron Stud

This newly designed stud is inserted into the square hole in the box. The bar fits snugly under the straps in the box and through the opening in the stud. When the box is properly positioned on the bar, a slight turn of the screw in the stud holds it firmly to the bar. The box cannot swivel. There is no strain on the screw. It merely holds the box in the desired position on the bar.



A SLIGHT TURN OF THE SCREW HOLDS IT THERE. THE BOX IS MOVED TO THE PROPER POSITION.

The 54151-NSB For Non-Metallic Sheathed Cable 14-2, 14-3, 12-2 and 12-3



Entry of Non-Metallic Sheathed Cable is quickly made through either side or bottom of the box.

Cable is held firmly by this heavy-guage, smoothly-rounded clamp without the slightest injury to the insulation.

This box is mounted on a No. 6001 bar. The same box, catalogued No. 54151-NSDB, is mounted on a No. 6002 bar.

The 54151-ASB For Armored Cable 14-2, 14-3, 12-2 and 12-3

Ample openings, smoothly bushed to prevent injury to the insulation, permit free and easy entry of Armored Cable through either bottom or side of box, without backing out the screw. The clamp holds the cable firmly.

This box is mounted on a No. 6001 bar. The same box, catalogued No. 54151-ASDB, is mounted on a No. 6002 bar.

Screws in both "N" and "A" clamps are staked to prevent vibrating out of the box in transit.

Listed by Underwriters Laboratories, Inc.

Steel City Leads in Meeting Your Needs

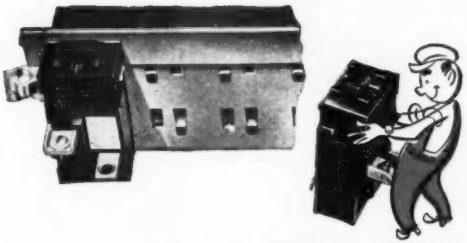
STEEL CITY ELECTRIC CO.

OUTLET BOXES AND COVERS SWITCH AND FLOOR BOXES
JUNCTION BOXES, CONDUIT FITTINGS AND ELECTRICAL SPECIALTIES

PITTSBURGH 33, PA.

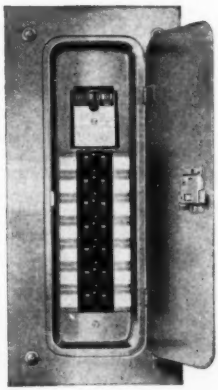
Only *Pushmatic*® offers...

1. simple push-button switching



2. individual units for flexible installations

Service Equipment Type
Up to 8 circuits



P1B Type
4 to 20 circuits
Single Phase, 3 Wire

P3B Type
12 to 42 circuits
3 Phase, 4 Wire

These handsome Pushmatic Electri-Centers are representative of BullDog's complete line for finest circuit protection and control. Write now for complete information.

SIMPLEST switching . . . most flexibility . . . surest protection . . . easiest installation . . . they're all yours in BullDog's Pushmatic Electri-Centers.

Just PUSH to make or break circuit. If circuit is broken by short or overload, PUSH and electrical service is immediately restored. No manual resetting . . . no fuses to fuss with.

Compact, individual-unit Pushmatics provide versatility and flexibility never before possible in any panelboard! Interchangeable regardless of rating or type, Pushmatics can be quickly inserted, removed or interchanged any time to meet changing electrical requirements.

Pushmatics revolutionize installation, too. Electri-Centers are compact yet provide larger wiring gutters, easier removal of interior assembly and complete accessibility of all electrical connections.

There's a Pushmatic to meet every load condition: THERMAL-MAGNETIC and THERMAL-MAGNETIC with exclusive AMBIENT COMPENSATING FEATURES. Ratings of 15, 20, 30, 40 and 50 amperes, 1 pole, 120 V., or 2 poles, 120-240 V., A.C.

For the last word in circuit protection and control, specify Pushmatic Electri-Centers!

BULLDOG ELECTRIC PRODUCTS COMPANY
DETROIT 32, MICHIGAN • FIELD OFFICES IN ALL PRINCIPAL CITIES
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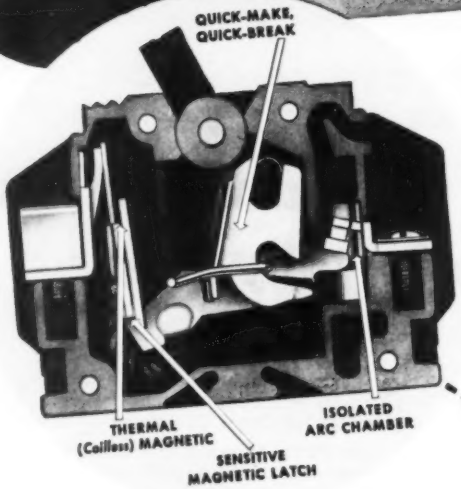
BULLDOG

HEADQUARTERS FOR ELECTRICAL DISTRIBUTION

NEW TYPE QB CIRCUIT BREAKER
for NQB Lighting Panelboards



a NEW QB circuit breaker for NQB panelboards features an isolated arc chamber lined with arc resisting material which eliminates need for metal plates or other interrupting means. Operating mechanism is quick-make, quick-break. Stainless steel latch, independent of trip element, assures superior vibration characteristics. Thermal-(*Coilless*) Magnetic trip element is typical of other lighting panelboard types in Square D's broad line.

All Have 2-WAY PROTECTION

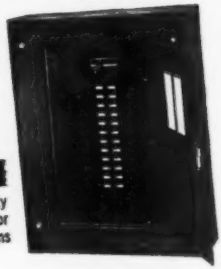
THERMAL element is a bi-metal providing positive and timed response to heating effects of both load current and surrounding atmosphere. The life of wire insulation is prolonged by limiting total temperature to a safe value.

MAGNETIC element responds instantaneously to the higher values of current characteristic of dangerous overloads and "shorts." Damage is minimized.

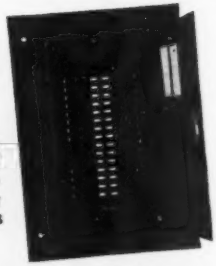
Both ARE NEEDED FOR Complete PROTECTION

Completes the Line

TYPE **NMO**
MO Plug-In Standard Duty breakers for AC systems



TYPE **NQB**
QB heavy duty breakers for AC systems



TYPE **NAB**
ML heavy duty breakers for AC-DC systems

Write **for Bulletin 1640, Square D Company, 6060 Rivard Street, Detroit 11, Michigan**

ASK YOUR ELECTRICAL WHOLESALER FOR SQUARE D PRODUCTS

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

Washington Report

NPA'S construction order M-4 was revoked August 3rd, simultaneously replaced with a new and tighter regulation, order M-4A. Reason: stated requirements for structural steel and other critical metals were more than double the supply.

New order M-4A prohibits any type of construction requiring more than two tons carbon steel, 200 pounds of copper, or any quantity of aluminum, alloy or stainless steel, except on authorization and allotment of materials. It places all construction under NPA's CMP beginning October 1. It establishes self-authorization for small quantities of critical materials through Direction 1 to CMP Reg. 6.

Result of new building restrictions will be virtual stoppage of all commercial construction, even tightening of controls for some urgently needed defense facilities. Exceptions, under current NPA criteria, may be some facilities that provide needed services in the vicinity of military bases or defense plants, or that supplement mobilization activities. But commercial projects nipped now will backlog—volume already shelved is tremendous—will create huge potential when unrestricted building returns.

Military public works construction is expected to boom in fourth quarter, will take up some of slack due to virtual stoppage of commercial construction. Also booming will be industrial defense construction, especially facilities expansion for steel, aluminum, and projects essential to public health, safety, or welfare.

Copper shortages continue to be serious problem. This is reflected by NPA's new limits for copper in new home construction in Direction 1 to CMP Reg. 6 (Aug. 3), and by recent release of 25,000 tons from the U. S. stockpile. Copper wire and cable shortages may increase due to disruptions in production schedules caused by shift to CMP, but should ease late in Fall.

Electric power output continues to hit new weekly peaks (over 7,164,000,000 kwh third week in August), reflects continued gains in the production rate. BLS reports new record for productivity per manhour in 1950, with 1951 estimated to be holding to this record rate in spite of labor shifts to defense work, breaks in supply channels, and materials curbs.

Demands for steel for direct and indirect defense use, climbing fast, are expected to slow the defense pace before the year end, or result in further cutbacks for most civilian hard goods—autos, home appliances, etc. Defense demand is now about 58% of total output. Prospect is for still greater demand of total in 1952, and until new expanded capacity goals are reached around mid-1953.

Price control laws are not likely to be tightened further, as was earlier expected. For one thing, revisions result in time-taking fights; for another, Congress is not in a mood for a quick about-face at this time.

An industrial dispersion policy, drawn up by NSRB, has been endorsed by President Truman. Under this new plan new plants are now encouraged to locate just outside highly congested metropolitan and manufacturing areas through government incentives—certificates of necessity for accelerated tax amortization, allocation of critical materials for construction, defense loans, and defense contracts. But the plan does not suggest that established industries be moved, and the NSRB group does not favor underground plant locations except in special cases.

CRESCENT

IMPERVEX TRENCHWIRE AND TRENCHCABLE

CAA Approved

for Airport Lighting

CRESCENT IMPERVEX TRENCHWIRE and TRENCHCABLE are well known underground cables approved as TYPE "A" under CAA Specification L-824 for 600 volts.

Cables for 3,000 volt and 5,000 volt to the same specification can be furnished.

Tens of millions of feet have been giving outstanding trouble-free service for many years. Write for bulletins No. 491 and No. 492.

CRESCENT

WIRE & CABLE

CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, N. J.

SEPTEMBER . . . . at a Glance

Outstanding Construction

Two major electrical projects are described in our Outstanding Electrical Construction Series this month. Both are significant work of the times and represent a fund of practical job ideas.

Studebaker's plant-wide rewiring and electrical modernization project is one of the outstanding jobs of its kind in recent years. Carefully planned and executed, the decision of some five years ago means that Studebaker's electrical plant today is capable of carrying loads and adapting to the requirements of maximum production for both civilian and defense items.

The second project is, next to the Pentagon, the world's largest office building wiring project; the new General Accounting Office in Washington. Designed to house ten thousand office workers, it uses about 2,000 watts per worker to provide high quality lighting, air conditioning, vertical transportation by both elevators and escalators, and other electrical features. Power is distributed at medium (13.2 kv.) voltage to compact in-building load centers, where it is transformed to utilization voltages. Secondary distribution from load centers is by means of heavy bus duct feeders which rise vertically from basement to top floor through wire closets—a layout comparable in every respect to that for today's best industrial power distribution system design.

Electrical work for this 900-day building project was contracted for by three of Washington's major electrical contracting firms, to insure adequate labor as required without disrupting normal service to regular customers over this long period of time. Details of operation of this joint venture, and of the engineering and installation features of the power and lighting systems are given in "Wiring for GAO."

After the Flood

As we indicated on this page last month, Middle West Editor August Eckel has prepared a picture report on how Kansas City electrical contractors and motor repair shops are tackling the tremendous rehabilitation job on electrical systems in that area. The article appears on page 74.

NPA Contacts

Too often industrial people know the National Production Authority only as a set of initials and regulation numbers. Responsible people there, however, are capable industry specialists who can be expected to understand our business problems. Eastern Editor, Berlon Cooper, who was himself an official of the former War Production Board, gives us in this issue a quick picture of how the electrical industry is represented in defense mobilization and who the people are. "Your Contact With NPA" begins on page 72.

DATES AHEAD

International Association of Electrical Inspectors — Southwestern Section, Hotel Lafayette, Long Beach, Calif., September 13-15; Northwestern Section, Hotel Davenport, Spokane, Wash., September 19-21; Western Section, Hotel Fontenelle, Omaha, Neb., September 25-27; Eastern Section, Claridge Hotel, Atlantic City, N. J., October 1-3; Southern Section, Hotel John Marshall, Richmond, Va., October 15-17.

International Municipal Signal Association, Inc.—Annual convention, Mark Hopkins Hotel, San Francisco, Calif., Sept. 17-20.

Canadian Electrical Manufacturers Association—General Brock Hotel, Niagara Falls, Ont., September 26-28.

National Farm Electrification Conference—Hotel Gibson, Cincinnati, Ohio, October 9-10.

National Electrical Contractors Association—Annual Convention, Shoreham Hotel, Washington, D. C., October 9-12.

International Association of Electrical Leagues—16th Annual conference, Roosevelt Hotel, New Orleans, La., October 10-13.

Electrical Manufacturers' Representatives of Virginia, Inc.—First Annual Electrical Industry Show, John Marshall Hotel, Richmond, Va., October 15-17.

American Institute of Electrical Engineers—Fall general meeting, Hotel Cleveland, Cleveland, Ohio, October 22-26.

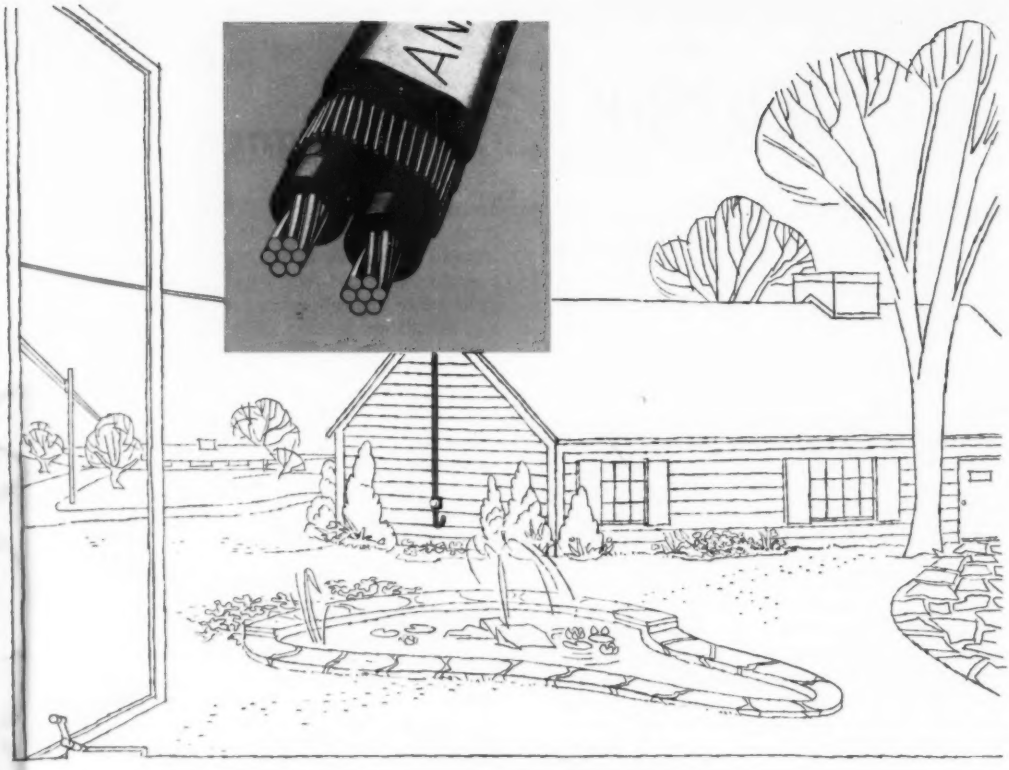
National Electrical Manufacturers Association—Haddon Hall, Atlantic City, N. J., November 12-15.

Plant Maintenance Show—Convention Hall, Philadelphia, Pa., January 14-17, 1952.

America Institute of Electrical Engineers—Winter general meeting, Hotel Statler, New York, Jan. 21-25.

National Industrial Service Association—Annual convention, Stevens Hotel, Chicago, Ill., April 20-23.

4th International Lighting Exposition and Conference—Cleveland Municipal Auditorium, Cleveland, Ohio, May 6-9.



for the long service view SILVALINE

Weatherproof Service Entrance Cable

SILVALINE*, Anaconda's completely new service entrance cable, offers greater dependability, longer life and higher resistance to weather. Here are the four reasons why!

1. **TRUE URC SATURANT** and finishers provide durable fibrous covering with unexcelled weathering properties.
2. **TOUGH NEOPRENE TAPES** cover each individual conductor . . . increase resistance to heat, moisture and weather! Two colors, black and red, give the preferred means of colored conductor identification.
3. **GLASS AND COTTON** combination over-all braid covering provides higher resistance to deterioration and adds life to the covering.
4. **SILVER FINISH COATING** provides clean handling and an attractive surface . . . makes a greatly improved base for house paint . . . makes doubly sure the URC saturant and finishers will not discolor externally applied paints. 1136TB

Get complete information on the new Silvaline URC-Type SE Weatherproof Service Entrance Cable from your nearest Anaconda Sales Office or Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Trademark

the right cable for the job

ANACONDA® **WIRE AND CABLE**

ELECTRICAL CONSTRUCTION AND MAINTENANCE

50th Year —SEPTEMBER • 1951

Minimum Use

CONSTRUCTION CONTROLS have taken on a new pattern. A policy may be shaping up leading to severe deterioration in electrical work. Heretofore, controls have cut back projects by type and end use. A new criterion has been added—minimum use of critical materials. And this one is loaded when applied to electrical work.

USE OF COPPER in electrical systems is functional. It is a conductor of electricity. And that's all. Use of more or less wiring is determined by considerations of utilization requirements; light, heat, power, communication; at appropriate efficiency, reliability, flexibility, and accessibility.

ORDINARY COMMERCIAL PRACTICE dictates reasonable economy of wiring design in any practical project. Under the new controls, however, architects and engineers will be asked to declare that the project they want approved uses a minimum of critical materials. Since wiring can always be reduced by eliminating the loads which require it, such a declaration would be nonsense.

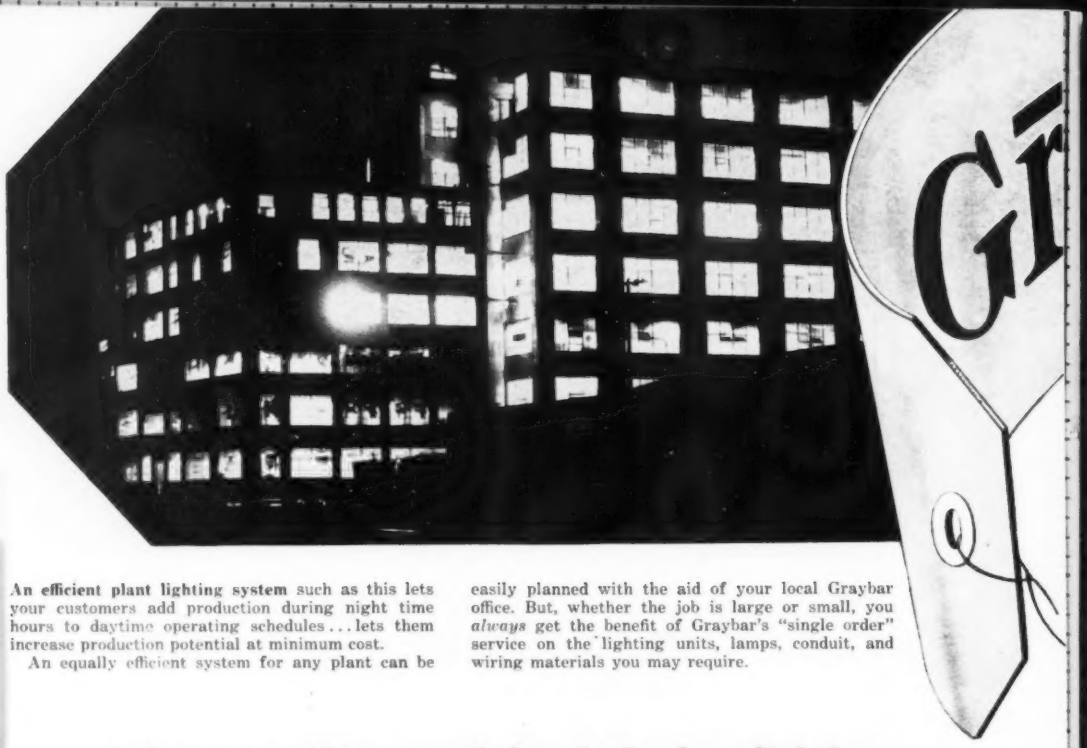
THERE'S ANOTHER GIMMICK in the new policy. Review for approval is to be conducted by claimant agencies. Take housing. That is under the Housing and Home Finance Agency, generally known as H. H. F. A. They threaten a dim view of projects which provide for any future facility. Since adequacy and provision for future use are the very essence of economical house wiring, the builder is evidently going to give short weight in wiring or have his projects turned down. If this seems unreasonable, it may be noted that an H. H. F. A. news release recently suggested the "emergency" substitution of steel for copper in house wiring.

CONTROL OF DESIGN and specification today is under the compulsion of mobilization priorities. Such temporary distortions of value are awkward enough when applied to products of limited life, like automobiles, television sets, or shoes. But wiring and plumbing and roof flashing and heating plants are expected to function economically and satisfactorily long after current shortages are forgotten.

IF CONSTRUCTION IS ESSENTIAL, it should be granted the quantities of scarce materials that good engineering requires. If it is not essential, it can be halted or deferred. If the materials emergency is so desperate that substandard wiring installations are imperative, it seems to us that there are other areas of the national economy that should get drastic treatment beyond anything now in prospect.

IT ISN'T THAT DESPERATE. We don't need a vast new empire of construction review specialists to haggle over the details of plans and specifications. We don't need vast new files of sworn certifications as to the "minimum use of critical materials" when the phrase itself is impossible to define. The policy is wrong. The procedure is unworkable. N. P. A. should call it back for further study and bury it deep.

William T. Stuart



An efficient plant lighting system such as this lets your customers add production during night time hours to daytime operating schedules . . . lets them increase production potential at minimum cost.

An equally efficient system for any plant can be easily planned with the aid of your local Graybar office. But, whether the job is large or small, you *always* get the benefit of Graybar's "single order" service on the lighting units, lamps, conduit, and wiring materials you may require.

Before you plan round-the-clock plant lighting—

Look behind the Graybar tag

Graybar can also furnish everything you need for office lighting. Because we distribute a complete selection of the best-known lighting units, you can always be sure of impartial product recommendations.

Your industrial customers, today, face a dual responsibility. They must meet increased defense quotas and, at the same time, retain their regular markets through continued production of normal lines.

An efficient plant lighting system for round-the-clock operations is an obvious answer. It automatically increases plant production . . . improves employee efficiency and reduces spoilage even on normal daytime shifts.

Years of lighting experience stand behind the Graybar tag, for we have worked with electrical contractors and their customers to plan and supply lighting systems of every type. That's why, when you order via Graybar, you can be sure the light will be right for the job—the *right* unit . . . the *right* quality . . . the *right* characteristics.

On out-of-the-ordinary installations, feel free to ask for the assistance of a Graybar Lighting Specialist. You'll find him well qualified to advise both on installation methods and the selection of the proper lighting equipment.

And remember, too, that Graybar distributes "everything electrical" for communication, ventilation, wiring, and power. Our nation-wide network of offices and warehouses helps us give the fastest possible service on every order.

188-49

GRAYBAR ELECTRIC COMPANY, INC.
***Executive Offices:* Graybar Building, New York 17, N. Y.**

Avoid electrical delays—plan ahead . . . via Graybar

IN OVER 100 PRINCIPAL CITIES

Rewiring at Studebaker

By E. G. Morehouse
Electrical Distribution Engineer
The Studebaker Corporation
South Bend, Indiana

By boosting distribution voltage to 13.2 kv and rehabilitating its electrical system, Studebaker broke a serious power bottleneck at its South Bend plant.

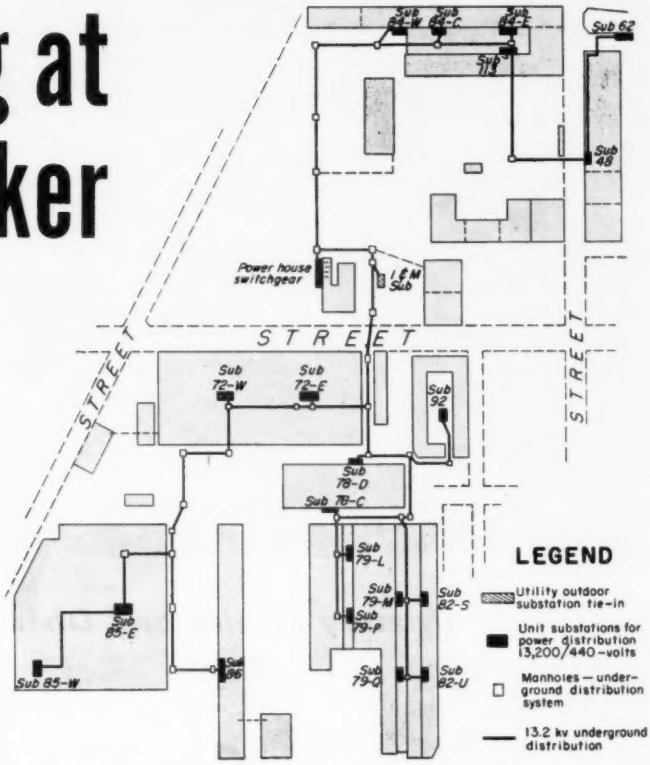


FIG. 1—Primary distribution system at 13.2 kv serves unit substations at various buildings. Three-conductor cables are installed in multiple-duct underground runs.

When Studebaker brought out its first postwar car following World War II, management took a long hard look at its plant facilities. The object was to uncover any possible "bottlenecks" to the full and efficient production necessary to meet existing and future demands. What it saw in the electrical system survey was not at all to its liking. The plant engineering department's report revealed some serious danger spots—conditions which might result in power system failures, department shutdowns, scrambled production schedules; and the possibility of limited production due to inadequate power facilities. Should any of this actually happen, Studebaker might find itself seriously handicapped in the competitive field. And management wanted no part of that.

Out of this realistic appraisal came a long-term, multi-million dollar plan to start from scratch and completely rehabilitate the entire electrical system. Giffels & Vallet, Inc., associated engineers and architects of Detroit, Mich., were commissioned to work with plant engineering on the rewiring design. Hatfield Electric Company, electrical contractors of Indianapolis, Indiana, handled the complete electrical installation out of their South Bend office.

Involved in the huge project were: a new stepped-up primary voltage distribution system; rewinding of central station generators (Studebaker generated about 72% of its available power supply); new central station switchgear; additional utility stand-by capacity; completely revamped secondary power and lighting distribution; and relighting for higher intensities. In all some 42 unit substations (2,000 and 1,000-kva for power; 500-kva for lighting) were installed with provisions for future addition of about 18 units. Flexible bus duct distribution replaced open wiring for power in manufacturing areas. Fluorescent lighting replaced incandescent units throughout the various buildings. Areas requiring immediate attention were completed first; others will follow to meet demands.

Studebaker now has a 13.2 kv underground distribution system to all its buildings; facilities to serve an ultimate load density of eight watts per sq. ft. for power and two watts per sq. ft. for lighting (former densities were 4.5 for power and 0.89 for lighting); a 10,000 kva tie-in with the utility; approximately 8,000 kva of capacitors for power factor correction; and substantial spare capacity for future load growth.

Because management made a wise decision some five years ago, Studebaker's electrical plant today is capable of carrying loads for maximum production of both civilian and defense items. Installation highlights, problems and solutions are covered in the following pages.

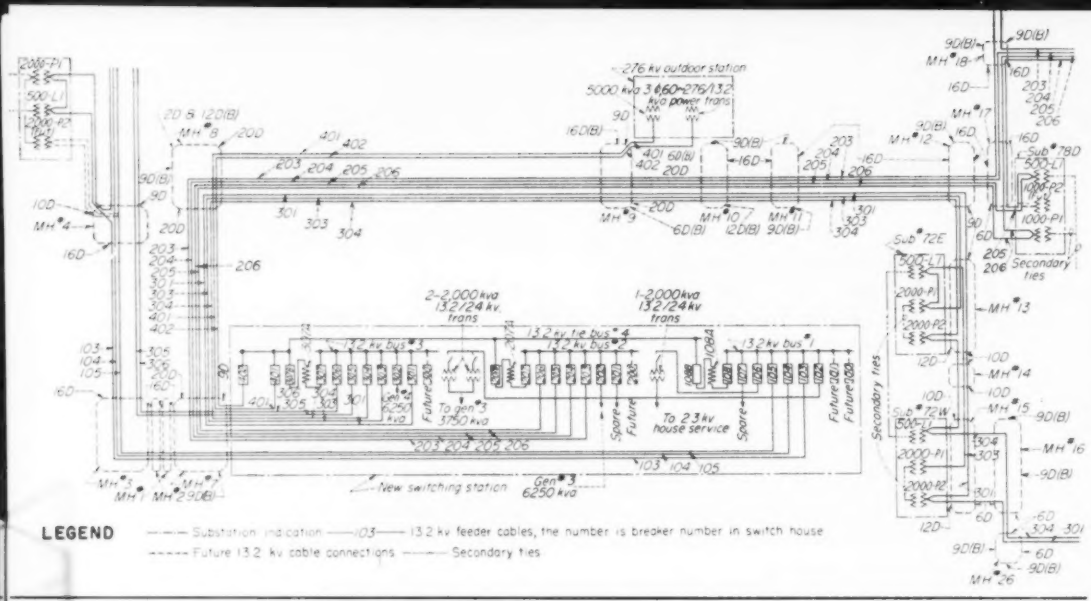

276 kv outdoor station
5000 kva 3 60~276/13.2 kva power trans
2-2,000 kva 13.2/2.4 kv. trans
1-2,000 kva 13.2/2.4 kv. trans
13.2 kv bus #3
13.2 kv tie bus #4
13.2 kv bus #2
13.2 kv bus #1
To gen #3 3750 kva
To 2.3 kv house service
Spare
Future
Secondary ties
New switching station
Gen #3 6250 kva
LEGEND
Substation indication
13.2 kv feeder cables, the number is breaker number in switch house
Future 13.2 kv cable connections
Secondary ties

FIG. 2—Sectionalized bus on 13.2 kv switching station adds flexibility to distribution system. Two buses are fed by rewound generators; a third by the 2.3 kv generators through step-up transformers. Note tie-bus fed by utility stand-by lines.

Primary Service and Distribution

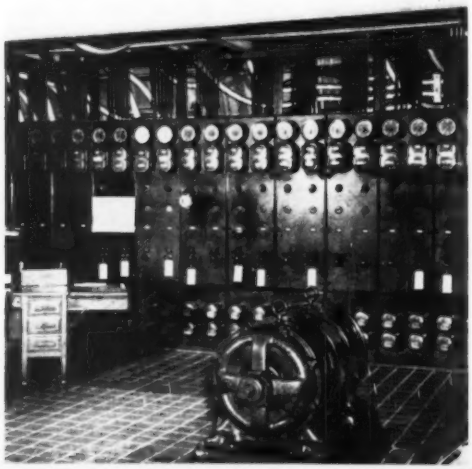
Existing primary distribution consisted of 2,300-volt feeders from Studebaker's central station to numerous transformer vaults throughout the plant. Many of these were roof-type vaults and most of the feeders were the aerial, open-wiring type running along and across the building roofs. Power sources consisted of four turbine-driven generators; two of 6,250 kva capacity each and two of 3,750 kva each. A stand-by utility transformer bank provided an additional 7,500 kva of power (three 2,500 kva, 27.6 kv/2.3 kv, delta-delta units).

All generator and transformer sources fed a central station bus through single-pole, double-throw, open knife switches and 2,000-ampere oil circuit breakers. The main bus, in turn, served twenty 2,300-volt feeder circuits through open knife switches; a 1,200-ampere and 300-ampere oil circuit breakers. There were no spare or unused circuit positions on the central station board. Circuit loadings ranged from 16% to 122% capacity. Plant power factor averaged 69%.

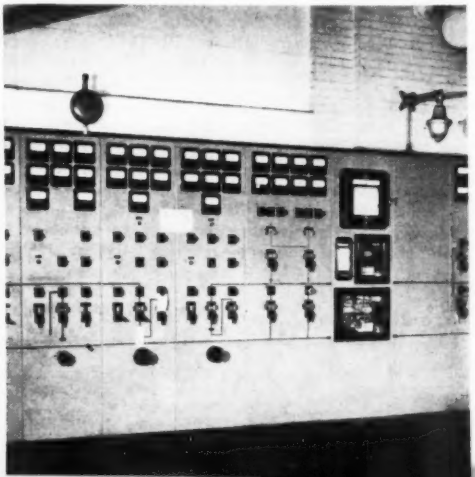
Interrupting capacity was the problem which required immediate attention. Central station circuit breakers, purchased in 1918 and 1922, had an interrupting rating of only 50,000 kva. Calculations of interrupting capacity on existing circuits showed a need for a minimum of 250,000 kva I.C. rating on circuit breakers. This condition, coupled with over-loaded circuits, lack of spare capacity, plus the continuous growth of power and lighting loads led to consideration of higher distribution voltages.

Two courses were open. Stepping up to 4,160 volts or 13,200 volts. Choice of the former would bring the wiring

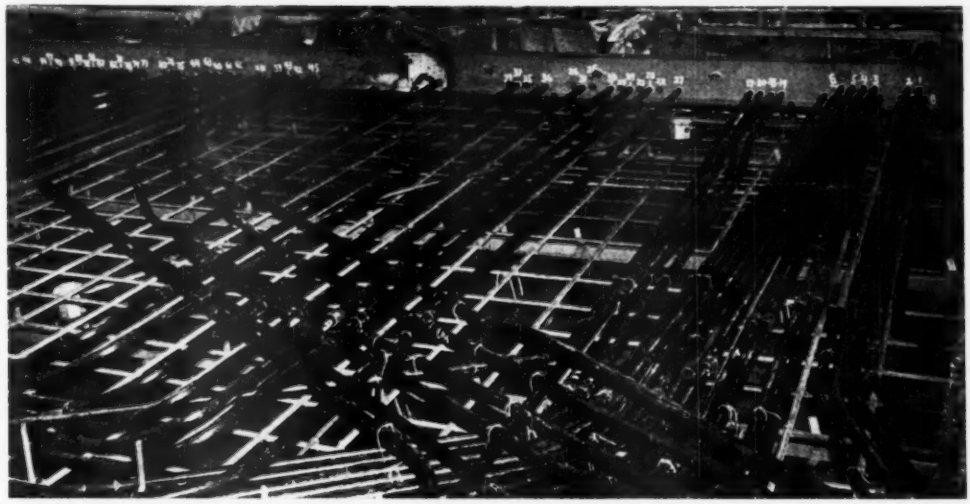
OLD NERVE CENTER of the original 2.3 kv distribution center in the power house gives way to . . .



NEW 13.2 KV CONTROL board in power house adjacent to addition which houses . . .



Rewiring at Studebaker . . . Outstanding Electrical Construction



MAZE OF CONTROL CONDUITS on floor forms of new switchgear room addition before pour. Circuit number and conduit size data were painted on forms to guide electricians installing conduits.

up to date but would not provide adequately for future growth. Hence the rewiring design was based on 13.2 kv distribution.

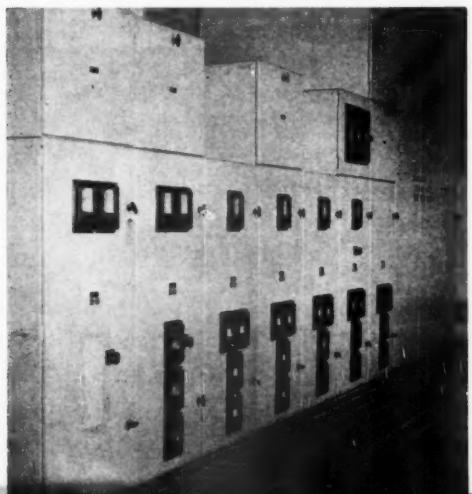
Since the complete changeover would take about three to four years, provision had to be made to operate the old 2.3 kv system while new facilities were being installed. The two 6,250 kva generators were rewound for 13.2 kv without derating. The two 3,750 kva generators (2.3 kv) plus the 2.3 kv utility stand-by kept the plant going while the complete shift to higher voltage was gradually accomplished.

A new addition built on the power house encloses the new 13.2 kv central station switchgear. The board has three 13.2 kv buses plus a 13.2 kv tie bus served by two circuits from the new 10,000 kva, 27.6 kv/13.2 kv utility standby. Two of the buses are fed by the rewound 6,250 kva generators. The third section will be fed by the 2.3 kv (3,750 kva) generators through two 2,000 kva, 13.2 kv/2.4 kv dry type transformers incorporated in the switchgear design.

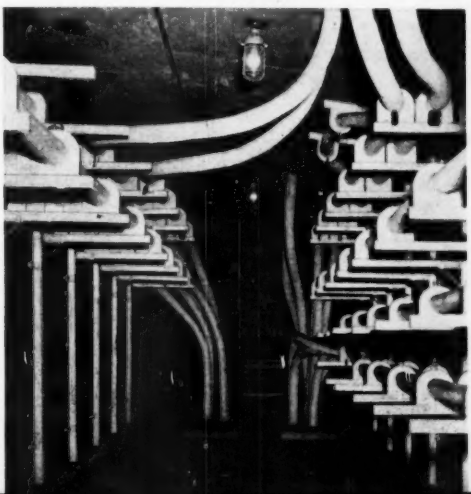
Primary feeder circuits leave this switchboard and go underground in 4-inch fiber conduit duct lines to the various buildings where they terminate at unit substations. In general, these circuits consist of three-conductor, No. 4/0, 15-kv, paper and lead, Type H shielded cables.

By shifting to underground distribution, plant engineers hope to eliminate most of the former overhead line trouble caused by lightning. A total of about three miles of concrete were torn up and approximately 12 miles of fiber conduit were installed in the multiple-duct underground distribution system.

13.2 KV SWITCHGEAR which ties in the rewound generators, stand-by service and 2.3 kv generators to new primary.



PRIMARY FEEDER CABLES are fireproofed and racked on split porcelain insulators in tunnel under switchgear room.



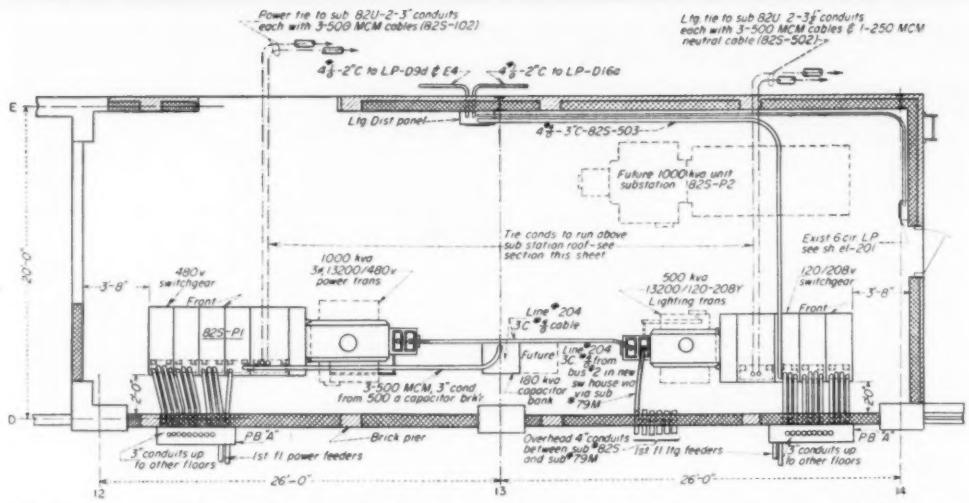

Power tie to sub B2U-2-3" conduits each with 3-500 MCM cables (825-102)
Ltg tie to sub B2U 2-3½" conduits each with 3-500 MCM cables & 1-250 MCM neutral cable (825-502)
4½-2"C to LP-D9d & E4
4½-2"C to LP-D16a
Ltg Dist panel
4½-3"C-825-503
Future 1000 kva unit substation 825-P2
Tie conds to run above sub station roof-see section this sheet
Exist 6 cir LP see sh el-201
1000 kva 3ø 13200/480v power trans
500 kva 13200/120-208Y Lighting trans
480v switchgear
120/208v switchgear
Front
825-P1
Line 204 3C ¾ cable
Future Line 204 3C ¾ from bus 2 in new sw house via sub 79M
180 kva capacitor bank
3-500 MCM, 3" cond from 500 a capacitor brkr
PB 'A'
Brick pier
3" conduits up to other floors
1st fl power feeders
Overhead 4" conduits between sub 825 and sub 79M
1st fl ltg feeders
20'-0"
3'-8"
26'-0"
12
13
14

FIG. 3—Vault layout for typical substations throughout the manufacturing buildings. Most vaults contain one 1,000 kva unit substation for power and a 500 kva unit sub for lighting. All have space for addition of future 1,000 kva unit. Note automatically switched capacitor bank for power factor correction.

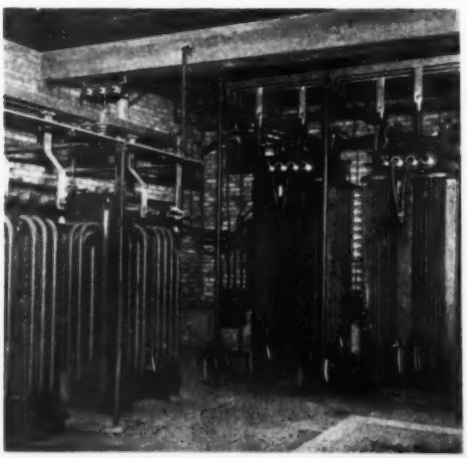
Secondary Distribution

Electrical modernization was carried beyond the new primary distribution. Although there was ample capacity now available at the new unit substations, there still existed the problem of general inadequacy of the secondary power and lighting systems. Power circuits were overloaded, lighting intensities were too low, and there was a need for a flexible type of power distribution that would simplify reconnection of machines during a department shift or change.

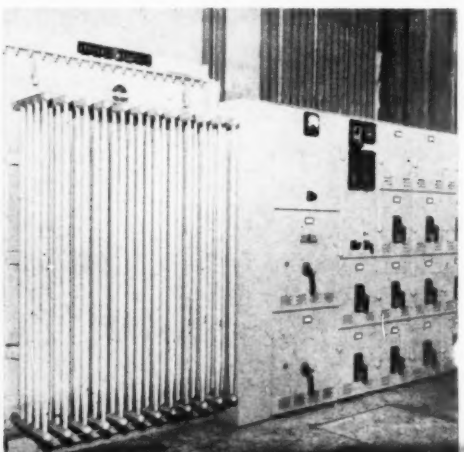
The final step in the long range rehabilitation program included complete rewiring of all secondary circuits. In fact, the existing wiring was practically abandoned in favor of new modern facilities.

A typical power unit substation consists of a 1,000 kva, 3-phase, 13.2 kv/480-volt transformer with associated secondary switchgear fed by a 1,600-ampere circuit breaker. The cubicles contain ten 400-ampere circuit breakers (one spare) and space for the addition of four future units. An emergency 800-ampere tie-breaker and circuit (two 3-inch conduits each with three 500MCM cables) interconnect adjacent unit substations on the secondary side. Secondary feeders consist of 3-inch conduits with three 500MCM cables to serve the power loads. In general, each feeder energizes a run of bus duct. Where power loads are heavier, unit substations are 2,000 kva in size with similar feeder and emergency tie-breakers.

OLD TRANSFORMER PENTHOUSES with open wiring and open buses on building roofs were replaced by . . .



MODERN UNIT SUBSTATIONS like this 1,000 kva, 13.2 kv/480-volt, 3-phase unit for power in first floor vaults.



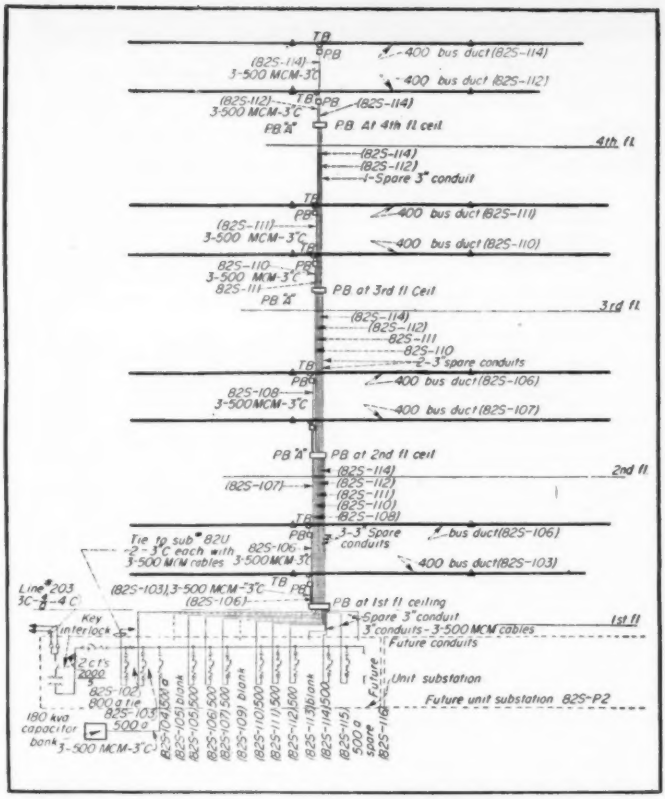


FIG. 4—Power riser diagram for typical multi-story building. Dual runs of 400-ampere bus duct tie in to feeders at each floor. Note secondary tie-breaker and feeder between substations for emergencies.

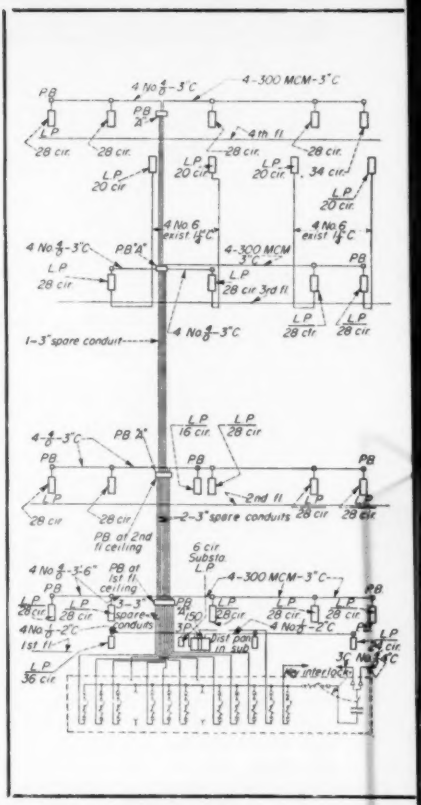
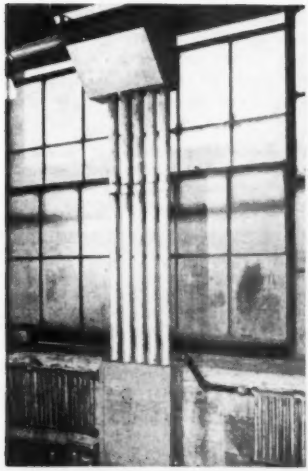
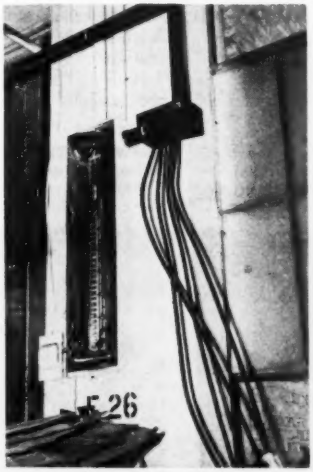


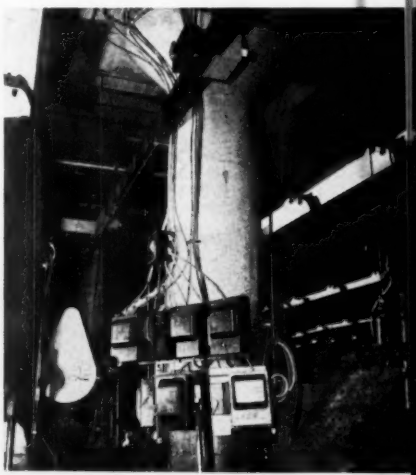
FIG. 5—**LIGHTING FEEDERS** follow same pattern as power distribution; branch at ceiling boxes to feed lighting panels.



RISER CONDUITS hug wall, have ceiling pull box for branches to feed bus duct or lighting panels.



NEW LIGHTING FEEDER is ready for connection to existing lighting panel. New modern panel will replace this.



MODERNIZATION IN PROGRESS in press shop. Flourescent lighting has already replaced dc incandescent units.

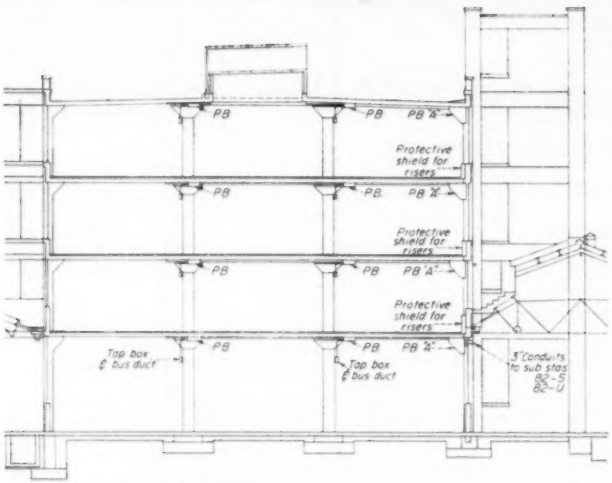


FIG. 6—DISTRIBUTION SCHEME for power rewiring in multi-story buildings. Riser conduits go through large ceiling pull boxes at wall at right; feeders branch out to ceiling pull boxes for connection to new bus duct lines.

Existing power distribution facilities consisted of open wiring and conduit feeders in most of the buildings. Under the rewiring plan, these circuits were replaced by two parallel lines of 400-ampere plug-in type bus duct running the full length of each floor in manufacturing buildings.

Since most of the plant structures are of multi-story design, secondary feeders are grouped at riser locations on the interior of a building wall. These conduits (including several spares) extend upward to feed each floor; terminate in a large triangular-shaped pull box at each ceiling juncture. Two feeders branch out laterally from these riser pull boxes to serve the two lines of bus duct on each floor.

At each floor level, all riser conduits are protected from mechanical damage by a 3-foot high (8-inch deep) box-like shield made of angle iron and sheet steel and filled with concrete.

All of the rewiring was installed while the plant was in full operation. Changeovers were made during week ends and normal down times. To maintain this schedule, feeders were installed and energized first. Temporary jumpers connected existing power distribution facilities to these new feeders while the bus duct was installed and energized. Then the gradual branch circuit shift from the old to the new wiring was made without interrupting production.

Power Factor Correction

Power factor ranged from 49, 54 and 57% in some buildings to 90 in others. Average for the entire plant was 69%. To bring overall power factor up to a desired 90%, capacitors were installed in the unit substation vaults.

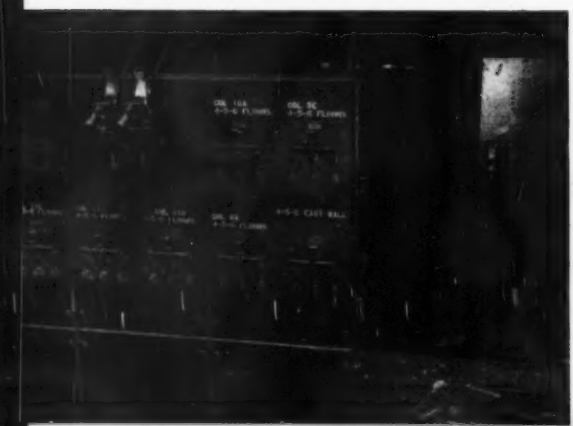
In general, 180 kva of capacitors were installed for each 1,000 kva of power transformer capacity. Thus each 1,000 kva unit substation had a bank of twelve 15 kva capacitors. In one vault, containing two 2,000 kva unit subs, 720 kva of capacitors were added.

The capacitors are not on the secondary system at all times, but are automatically controlled as the load varies. Through a current relay, they are switched on when a substation draws more than 700 amperes load; drop out of the circuit when the load drops back to this value or less. If necessary, capacitor units can be added to bus duct runs to further improve specific circuit power factor.

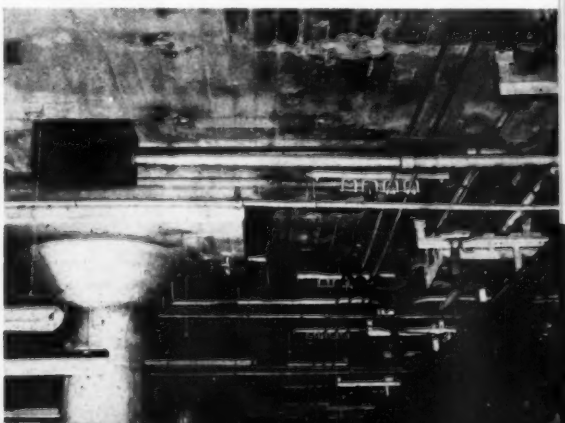
Relighting Program

Plant lighting was completely revamped. Some buildings were still using direct current incandescent lighting; others had alternating current incandescent; still others had modern fluorescent units on the old lighting circuits. Now all lighting in the manufacturing areas (with a few exceptions where hi-intensity mercury vapor is used) is standardized on RLM type fluorescent units (two 100-watt tubes) and operated from a 3-phase, 4-wire

OLD LIVE-FRONT LIGHTING distribution board and transformers in penthouse vault was replaced by modern 500 kva, 13.2 kv/120/208-volt unit substation in same vault as new power unit sub.



NEW POWER FEEDER terminates in ceiling pull box at column; will serve line of bus duct when installed. At present, it feeds existing pull box and open wiring which will be removed when both bus duct lines are in service.



system. One indication of the size of this part of the project is given in the interesting statistic that four buildings alone required a total of 19,700 fluorescent fixtures. So far about 20% of the lighting has been completed from the panels to fixtures.

The new lighting distribution system was based on an ultimate load density of two watts per square foot. Before relighting, this figure was 0.89 watts per square foot. A total of 15 unit substations for lighting are scattered throughout the plant area and housed in the same vaults with the power unit substations.

Each lighting unit sub contains a 500 kva, 13.2 kv/120/208-volt, 3-phase transformer. Secondary switchgear consists of a 1,600-ampere main circuit breaker and ten 225-ampere feeder breakers (one spare) with space for two future units. Like the power subs, it contains an 800-ampere tie-breaker and circuit (two 3½-inch conduits each with three 500MCM and one 250-MCM cables) for secondary side interconnection with an adjacent lighting substation.

In general, secondary feeders run to two sizes, depending upon the load served. All conduits are 3-inch size. Those serving the smaller loads contain four 4/0 cables; those for more distant loads contain four 300MCM cables. Riser conduits follow the same installation pattern as those for power; extend up at wall locations to serve multi-story buildings; terminate in triangular pull boxes at ceiling junctures; have the same protective shield at each floor level.

Floor feeders branch out at the riser pull boxes to serve groups of lighting distribution panels; terminate in a pull box above the panel location. Sub-feeder drops to panels containing 28 or more branch circuit breakers consisted of four 1/0 cables in 2-inch conduit; smaller sizes for smaller panels.

Feeders were installed first, energized and connected temporarily to existing lighting panels. The new fixtures, branch circuits and panels were then installed and the cut-over made during normal down time or after working hours. Wherever possible, existing materials were incorporated in the relighting installation.

Use Rectifiers

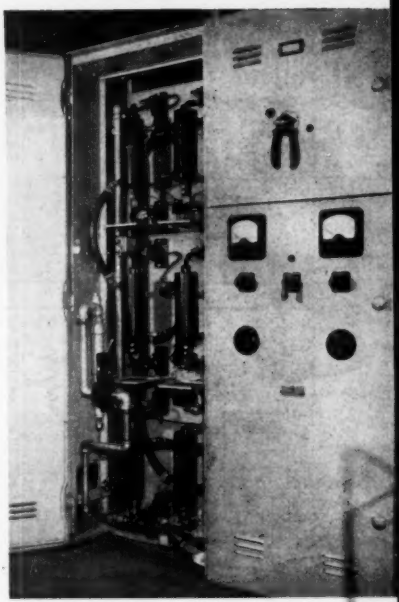
Formerly, direct current for lighting, cranes, hoists and other purposes was supplied by 2,300-volt motor-generator sets. With the elimination of dc lighting in four buildings, this load has been considerably reduced. In all except one case (where 2.3 kv service is still maintained through a transformer) these 30-year old m-g sets were abandoned and replaced by electronic (Ignitron) rectifiers to serve the crane and hoist loads. Four of these units are rated at 150 kv each; operate on the 480-volt power system; provide 250-volt direct current; will considerably reduce the maintenance time and cost previously required by the motor-generator equipment. A 500 kva unit is installed in the engineering building.

Also connected to the new power system is some 5,664 kva of welder loads. This is in addition to the conventional motor and miscellaneous power requirements.

To completely rewire a plant comprising some 5,555,000 square feet of floor space divided among a number of multi-story buildings scattered over a sizable area, was no easy chore. That this was accomplished without a hitch is a tribute to the careful planning and coordination of Studebaker's plant engineering department, the consulting engineers and the electrical contractor.

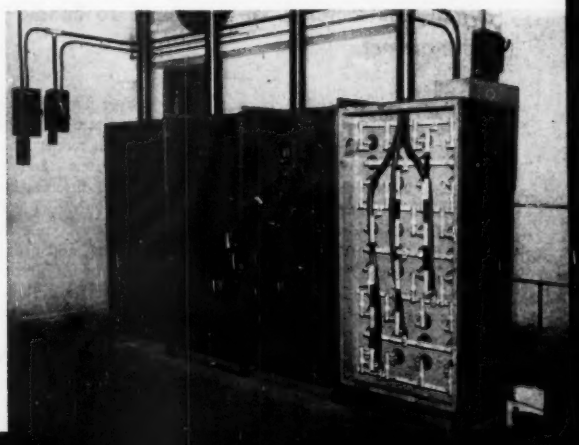
Approximately 30% of the secondary power system (bus duct) and 20% of the relighting is now in place. The rest of the rewiring will follow gradually to meet production demands.

When the long term project is completed, the Studebaker Corporation will have a power system that will stand behind it come what may in the way of civilian and defense production requirements. It now has modern distribution facilities, ample installed capacity and provisions for future expansion when necessary.

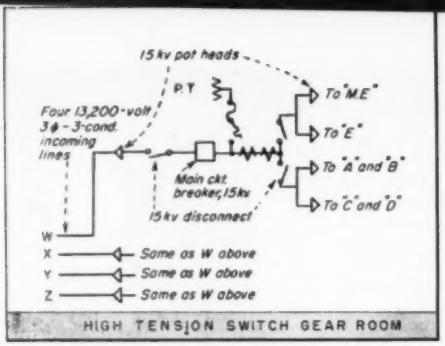


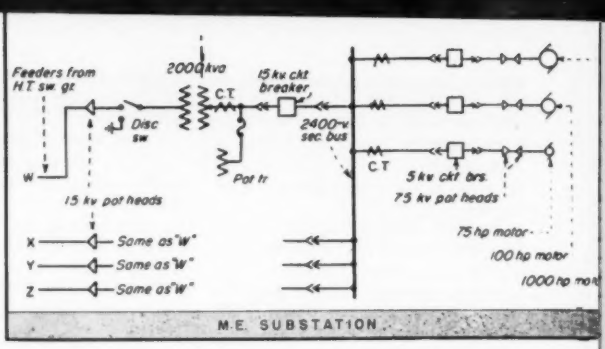
ELECTRONIC RECTIFIERS replace 30-year old 2,300-volt motor-generator sets to provide direct current for cranes, hoists.

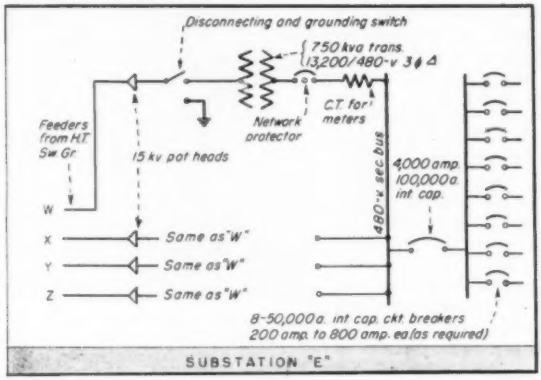
PULLING NEW FEEDER CABLES in power conduits in manufacturing area. Cables are passed around open pulley to get long pull in tight place. Power winch on jeep does the pulling. Men on scaffold guide cables around sheaves.

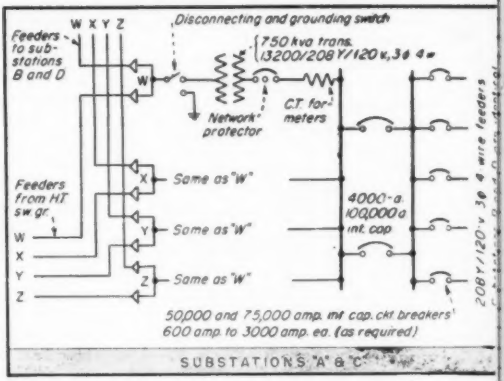


BANKS OF CAPACITORS in new substation vaults boost plant power factor to 90 percent. Here a total of 720 kva of capacitors (four banks of 180 kva each) are automatically switched to power feeders, served by two 2,000 kva unit substations.





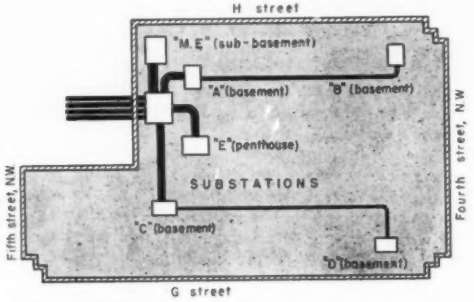



W X Y Z
Disconnecting and grounding switch
Feeders to sub-stations B and D
750 kva trans. 13200/208 Y/120 v, 3φ 4 w
Network protector
C.T. for meters
Feeders from HT sw. gr.
W
X
Y
Z
Same as "W"
Same as "W"
Same as "W"
4000-a. 100,000 a. int. cap.
208 Y/120-v 3φ 4 wire feeders
50,000 and 75,000 amp. int. cap. ckt. breakers 600 amp. to 3000 amp. ea. (as required)
SUBSTATIONS "A" & "C"

INCOMING PRIMARY FEEDERS are paralleled on secondary but at each substation only through network protection to provide maximum power reliability. Each incoming line is split at high tension switchgear into four separate 13.2 kv. feeders.

Wiring for GAO

Advanced lighting standards and a modern electrical distribution system network are features of the U. S. Government's new GAO building. Designed by the Electrical Unit of the Mech.-Elect. Section, Design Branch of Public Buildings Service, the installation was performed by Joint Adventures, a three-firm electrical contractor group organized to handle this project.



POWER FLOW DIAGRAM shows six spot-network transformer substations fed through 15 kv. switchgear.

By Berlon C. Cooper

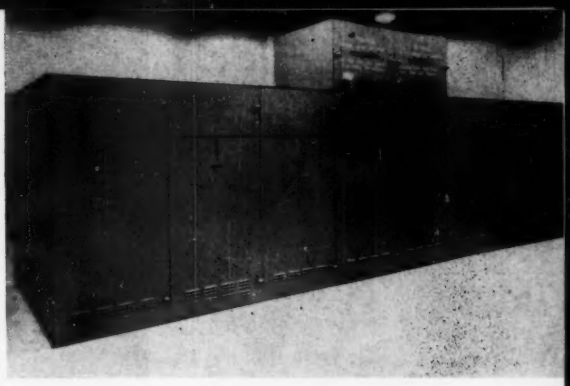
THE new General Accounting Office building contains nearly two million square feet of floor space. It is a seven story block-type structure, second largest office building in the world. It will house 10,000 office workers when fully occupied. Owned by the U. S. Government, and located in Washington, D. C., it is dwarfed in size only by the Pentagon building which is located across the Potomac River from the District of Columbia in the State of Virginia.

This modern new office building features new standards for office lighting, air conditioning for the entire building, both elevators and escalators, a 5000-line telephone switchboard, in-building feeding, and in-building parking facilities for 800 automobiles.

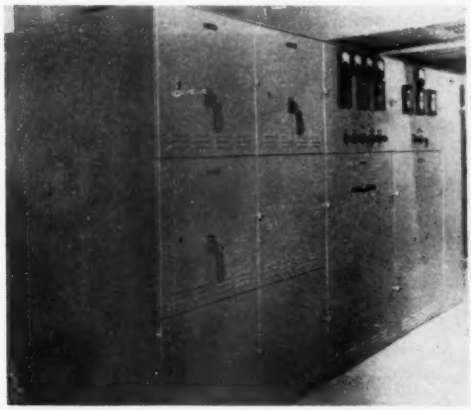
Electrical demands of the GAO building are provided by a transformer capacity of 23,000 kva, located in the building. Connected load totals 11,658 kw, used for the following purposes: lighting—4200 kw; power—2740 kw; air conditioning—4575 kw; electric cooking—143 kw.

Design of the electrical power system was dictated principally by the electrical power requirements. Reliability and good voltage conditions were major factors; also, the power com-

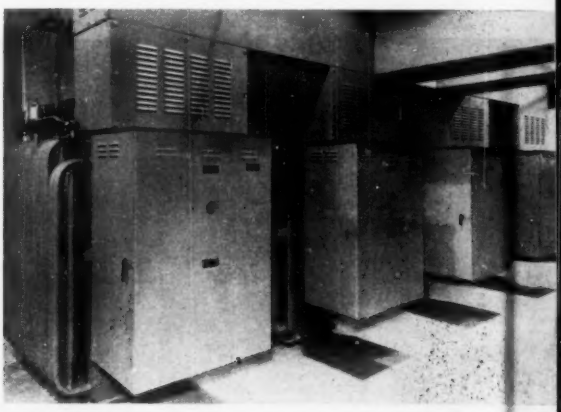
M. E. SUBSTATION contains four 2000 kva. transformers, metal-clad 2400-volt switchgear, connecting bus duct ties.



HIGH TENSION metal-clad switchgear for two of the four incoming 13.2 kv. power lines.



4000-AMP. BUS serves low voltage metal-clad equipment at 208Y/120-volts.



SECONDARY SIDE of 3000 kva. substation (1 of 5) showing 4000-amp. bus and 2500-amp. network protectors.

pany required that incoming primary feeders be not directly paralleled. The physical structure of the building itself was also a factor. It is a "block-type" building, made possible by air conditioning and good artificial lighting. The building covers most of an entire city block, and has no wings and courts to provide light and power to inside rooms. It is 634 feet long, 388 feet wide, and 118 feet high—seven floors, a basement, and a sub-basement.

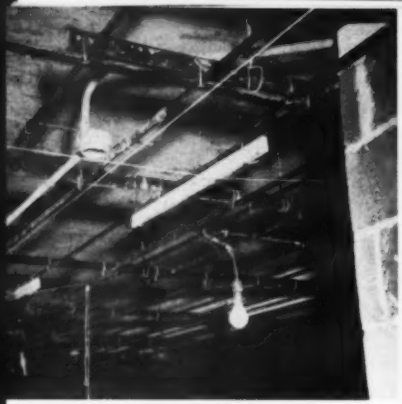
These power system requisites were met by selection of a spot network type distribution system. This system provides: 1) reliability—a feature of the spot network system; 2) low voltage drop—by locating unit substations at carefully selected load centers; 3) independence of incoming primary feeders, with transformers tied together only on the secondary bus. Because of the high cost of floor space, transformer and switching equipment was concentrated to save space.

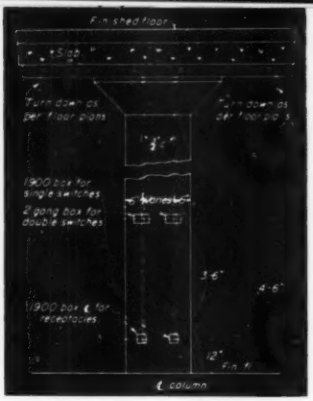
The General Accounting Office, which is housed in this new building, is an agency of Congress. It was established to keep tab on Government revenues and expenditures, and is known as the "watchdog of the Treasury". Its principal function is to audit public accounts, and to keep Congress informed on how and for what the Government dollar is spent. It operates entirely independent of the President or other Government branches or agencies. Its new home, the GAO building, cost in excess of $25-million, paid for through direct appropriation by Congress.

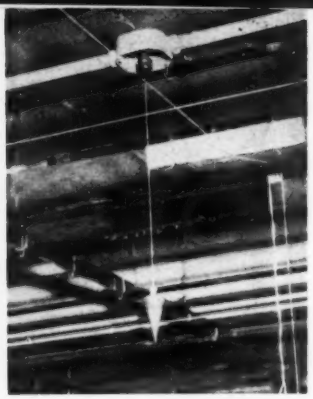
Primary Distribution

Primary service is supplied to the building at 13,200 volts, 3-phase, 60 cycles, grounded neutral. Four independent feeders of 3-conductor No. 4/0 each, installed in 4-inch fiberduct underground, run from the power company's adjoining 5th Street manholes into a high tension switchboard room in the building's sub-basement. Each feeder terminates in an incoming main line unit of metal-clad switchgear. Units consist of an incoming-line air circuit breaker unit, metering unit, and two feeder units containing dummy breaker elements as disconnect devices. The dummy breaker elements are mechanically interlocked with main circuit breaker to prevent opening or closing while the circuit is energized. Circuit breakers are rated 15 kw, 1200 amps, with interrupting capacity of 250,000 kva. Inverse time overcurrent, phase and ground relaying was provided on incoming circuits. Over and under voltage relaying, from a line-to-ground potential transformer, is used to trip the incoming line circuit breaker in the case of a single-phase ground fault on these lines.

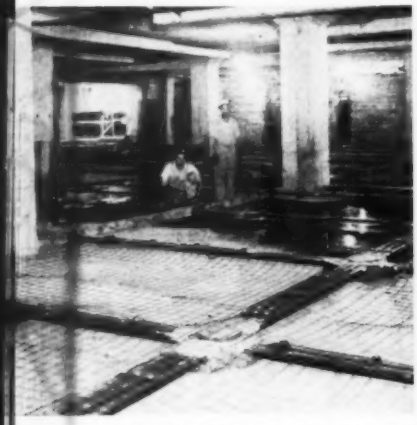
Primary distribution is continued from the high tension switchgear at 13,200 volts to six individual transformer substation load centers, where power is transformed to utilization voltages. Four transformers are used

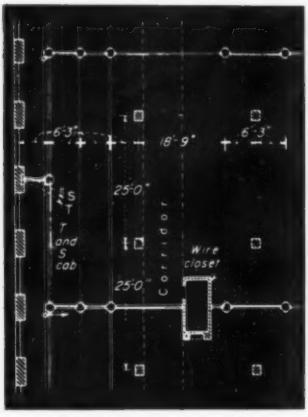




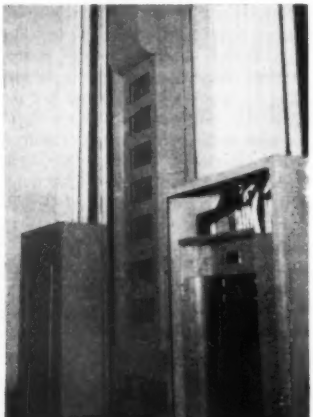


CONDUIT AND BOXES for column switches and receptacles were attached to concrete forms before pouring (Dwg). First lighting outlet in bay (Photo L.) is attached to pre-formed conduit switchleg. All other lighting outlets in bay (Photo R.) are located by plumb-bob with reference to floor bench marks.





UNDERFLOOR DUCT was transit-leveled (Photo L.), formed finish line for floor fill. Drawing (center) shows typical layout for UFD which supplies telephone, signal and 120-volt services. Floor of wire closets (Photo R.) contains curved and turn-up sections.



TYPICAL WIRE CLOSET is fed by 208Y/120-volt busduct, contains lighting panel, telephone and signal cabinets.

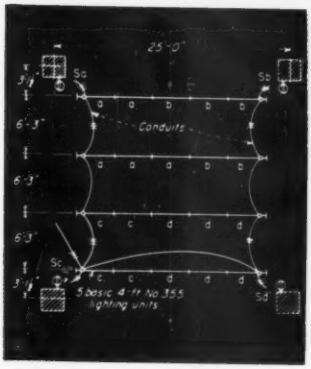
at each substation, and are paralleled on the secondary bus only at the substation utilization voltage. Also, at each substation each transformer is fed by a different primary feeder line, so that all four incoming feeder lines from the power company are used in each substation. Primary feeders from the high tension switchgear to all transformers are all 3-conductor No. 2 15-kv paper insulated lead-covered (PIL) cable, installed in 3-inch conduit. Paralleling connections between transformers and secondary bus bar or low voltage switchgear are made with overhead bus duct.

Capacities, secondary voltages, and other details of the six substations are as follows:

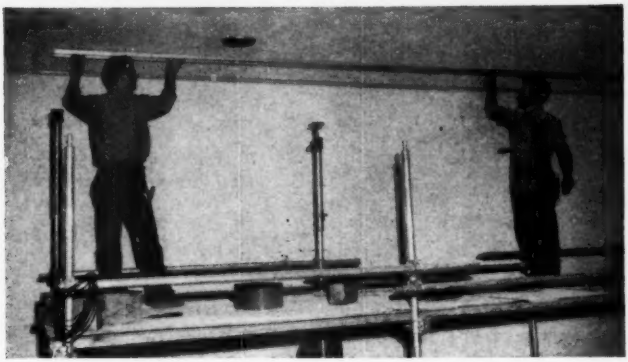
M. E. Substation (Sub-Basement)—Capacity is 8000 kva, supplied by 4/2000 kva askeral filled transformers. This substation supplies power for the 2300-volt air conditioning machinery motors which consist primarily of four 1000 hp synchronous motors, four 100 hp and four 75 hp induction motors. Provision is also made for future addition of 1175 hp of refrigeration equipment.

The four transformers are paralleled on the 2400-volt bus through four main secondary reverse power air circuit breakers, which are a part of the metal-clad switchgear equipment containing the controls for the large motors. Circuit breakers are rated 5 kv, 1200 amp, with interrupting capacity of 150,000 kva. Inverse current protection and inverse time overcurrent phase relaying are also provided.

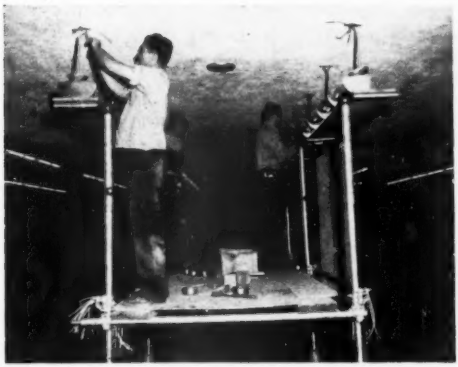
Substation "E" (Penthouse)—Capacity is 3000 kva, supplied by four 750 kva askeral filled transformers, 480 volts secondary. This substation supplies power to the elevator and ventilating equipment. Transformers and secondary bus are connected through



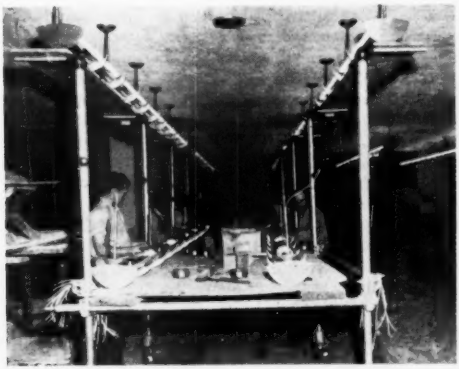
SWITCHING AND WIRING layout for a typical bay.



ALUMINUM TEMPLATE is used to position straps for intermediate stem hangers of 20-foot long lighting units.



FOUR-MAN CREW installs two 20-foot long lighting units at once from rolling platform, on "production line" basis.



20-FOOT LIGHTING UNITS are assembled on rolling platform from wired sections of fixtures plus stems and canopies.

network protectors. Four sub-distribution equipments of low voltage drawout metal-clad switchgear, located in penthouses, are supplied to furnish power to elevators.

Substations "A", "B", "C" and "D" (Basement)—These four 208Y/120 volt substations, with 12,000 kva of connected transformer capacity, supply power for all lighting, cafeteria, small power and business machines. Each substation, with 3000 kva capacity, is a spot network which consists of four 750 kva askeral filled transformers, connected through network protectors to the 208 volt bus. Feeder draw out air circuit breakers were supplied in the low voltage switchgear. Each substation supplies power to a vertical load section extending from sub-basement to penthouse, the total building load being equally divided into four such vertical load sections.

Metering is provided in the high tension switchgear for the power company. In the 2300-volt and 480-volt substations metering is provided to indicate bus voltage, transformer current, and kw-hr consumption on all outgoing feeders. In the 208Y/120-volt substations metering is provided to indicate bus voltage and transformer current.

Secondary Distribution

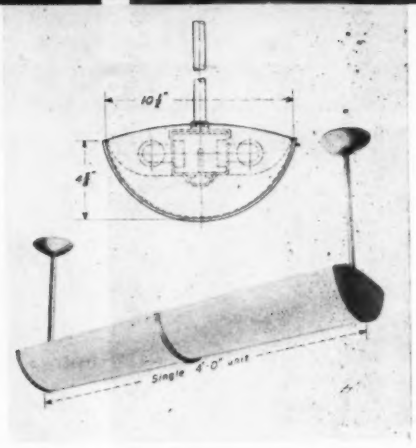
Secondary power is distributed from substations to point of utilization by means of busduct feeders to panels, and by conduit and wire from panels to branch circuits and final end use equipment. A total of 4342 linear feet of three-phase, four-wire low reactance busduct ranging in current ratings from 400 to 3000 amperes was required. Also, a total of 16 escalator control feeder panels, 10 power panels, 7 lighting distribution panels, and 212 lighting panels, were used.

The four 1000 hp compressor motors used for air conditioning are fed by 3-conductor No. 2/0 lead covered 5000-volt cable in 3-inch conduit. The four 100 hp condenser water motors, and the four 75 hp chilled water motors, are fed by 3-conductor No. 6 lead covered 5000-volt cable in 2-inch conduit.

Feeders from substation "E" in penthouse to passenger elevator motors are 800-amp busduct. Feeders to freight elevators, cooling towers and various fans, etc., in the penthouse mechanical equipment rooms are 600-amp busduct.

Each basement substation ("A", "B", "C" and "D") supplies power through busduct feeders to wire closets, with busducts rising vertically from the basement to wire closets on each floor. Busduct feeders are rated up to 3000 amperes to serve these wire closets, depending on individual loads. Each riser becomes smaller in size on upper floors. Escalator motors are served from basement substations

LUMINOUS INDIRECT LIGHTING provides seeing comfort for 10,000 office workers at GAO. Reflectors are Plexiglas acrylic plastic.



BASIC OFFICE LIGHTING UNIT. Over 30 thousand basic units (355) were used in this building.

through 16 control feeder panels, and operate on 208 volts. Busduct was selected in lieu of cable because it provides less voltage drop, is easier to install, and requires less space.

Substation "A" feeds two wire closets per floor, and subtations "B", "C", and "D" each feed three wire closets per floor. Wire closets contain lighting panels, power panels and telephone and signal system terminal cabinets. Lighting panels each contain 30 20-amp single pole circuit breakers, which are fed from the busduct at the bottom of the panel. A branch cable tap is incorporated in the busduct housing.

Branch Circuits

All branch circuit wiring is No. 12 wire in conduit. Home runs under 75 feet are made in rigid conduit with No. 12 wire; over 75 feet, with No. 10 wire or as required. Conduit for home runs is all ¾-inch rigid, and all hung ceiling work is ¾-inch EMT.

The new GAO building design is based on 25-foot square bays, center-to-center of columns. A lighting layout was selected which would permit partition changes, dividing bays into halves or quarters, and still permit local switching for each quarter-bay section from column mounted switches. Also, continuous row fluorescent units, each 20 feet long, were selected for lighting. These require only two ceiling outlets for wiring, one at each end, to also permit quarter-bay switch control, or removal of center lighting unit if partitions are later put in. Outlets for lighting, eight required per bay, were installed in the suspended ceiling by means of plumb-bob to 90° reference lines which were established from floor benchmarks. Outlets adjoining columns were attached to pre-bent and pre-installed conduit legs in concrete columns leading to switchgang boxes and duplex receptacles in the columns. Home runs were then made to wire closets from the nearest individual bay ceiling outlet, and all outlets in the same bay were connected by EMT jumpers.

Underfloor Duct

Telephone, signal and 120-volt electric service is made available in all office areas on all seven floors of the building through an underfloor duct system. Combinations of triple, double and single ducts, were installed according to plan, usually on 6-ft. 3-in. spacings. All three services are fed into the underfloor duct system from wire closets.

A total of 268,150 linear feet of underfloor duct was required. This duct was all transit-levelled in place on the floor before the floor fill was poured, with junction box tops acting as a guide for the finished floor level.

Lighting

New standards for office lighting were established in the new GAO building. A lighting layout and type of luminaire was used in all general and private office areas which are designed to provide a maintained level of 30 footcandles of comfortable, high quality lighting. Initial intensity readings before occupancy showed an average of 55 to 58 footcandles, and approximately 42 to 45 footcandles after furniture and miscellaneous office equipment were moved in. With reasonable maintenance, the design level of 30 footcandles is adequately insured.

The lighting equipment used on this project is of the Public Buildings Service's design and not the usual commercial equipment.

An outstanding characteristic of the general office lighting is the quality of the lighting. It is exceptionally comfortable, free from shadows and direct, or reflected glare. It is also uniform in intensity throughout all work areas. An unusually good visual environment was achieved through proper balance of reflectances of ceilings, side walls, floors and all trim; also through selection of a well designed luminous indirect fluorescent luminaire of the suspension type. Brightness ratios of less than two to one exist between the lighted luminaire and the brightest and darkest areas on the ceiling above and between the luminaires.

All general office lighting in this building is accomplished with one basic luminaire design—Public Buildings Services Type No. 355. This luminaire is a clean and simple line luminous indirect design, for use with two 40-watt T-12 fluorescent lamps, exactly 48 inches long. Continuous rows of any length in multiples of four feet can be provided with this basic unit. Over 30,000 of these basic units were used on this installation.

Typical 25-foot square bays, which constitute most of the office area, are lighted with four 20-foot lengths designated as No. 355-5 (five sections of the basic No. 355 unit) symmetrically spaced on 6-ft. 3-in. centers. Because of the open area arrangement of the building, with 25-foot wide bays extending up to 300 feet in length, it was possible to install these 20-foot long luminaires on a "production line" basis. To do this, the electrical contractor

made up rolling type platforms each 20 feet long. One was approximately six feet wide, another about 3 feet wide.

First installation operation was for two workmen to mark the ceiling for intermediate fixture stem locations between the two end outlets for the 20-foot long luminaires. A special 2-inch U-channel aluminum template was made up and used for this purpose. The narrow rolling platform was used for this operation.

Next, a four-man crew followed, working from the wide rolling platform. This crew's first operation was to install fixture straps on the four intermediate stem locations, using standard toggle bolts. Next, two 20-foot long luminaires were assembled on the platform. Wiring and mechanical connections were made between the sections, stems and canopies were attached, and the complete unit was then hoisted to the top platform support, and put in place ready for attaching to the ceiling outlets and straps. Final installation and wiring connections were then completed, with two men working on each long luminaire, after which the platform was rolled ahead to the next location and the procedure repeated for the next two luminaires. Proper planning in advance made this production line installation possible.

All miscellaneous pieces (canopies, stems, straps, etc.) were delivered to a central location on each floor where they were assembled and later distributed to the individual bay areas for attaching to the fixture bodies at the time of final installation.

Public areas, such as lobbies, cafeterias, assembly room, escalators, and the Comptroller General's suite of offices on the 7th floor, were lighted with special design luminaires and equipment. Cove lighting using fluorescent slimline lamps was used to light the main floor elevator lobbies and corridors. Entrance lobbies and all other corridors were lighted with recessed fluorescent troffers, some with louvres, others with diffusing glass panels. Escalator traffic is well lighted by recessed fluorescent units in the sloping ceilings, equipped with louvres in a vertical position so that traffic in the downward direction is well shielded from glare while light is efficiently directed onto the treads. Recessed troffers with diffusing glass covers, equipped with soft white fluorescent lamps, were used to light the dining rooms and cafeteries. Special design totally indirect suspended fluorescent troughs which fit the rooms geometrically and architecturally were used to light the Comptroller General's offices and special office suites.

Mechanical and service areas received the same careful treatment for lighting design. Indirect lighting from suspended fluorescent luminaires was used in the telephone room. Continuous row louvered fluorescent units with luminous sides provide high quality lighting in the machine room and carpenter shops. Motor rooms, transformer vaults, parking area in basement and sub-basement, ramps, and other similar areas are exceptionally well lighted with incandescent reflector units of proper sizes and types. In addition to the many incandescent lamps used, over 50 miles of fluorescent lamps are installed in fixtures and coves in this building.

Job Management

Electrical work for this project was contracted for by a three-firm group of electrical contractors who took the name of Joint Adventurers. The firms were: Harry Alexander, Inc., E. C. Ernst, Inc. and the Howard P. Foley Co., Inc., well known electrical construction contractors.

Job scheduling was handled through weekly meetings, at which time work was planned ahead for the following week.

Careful scheduling of purchases and deliveries made material storage a simple problem. Deliveries were scheduled so that no storing was necessary, especially in the early stages of construction, a storage space was unavailable and the building covered the entire site area. After the building was roughed in, it was used for storage to some extent. Big problem during the last year of construction was to obtain materials when scheduled for delivery, due to the materials shortages arising from the defense mobilization program.

Work was begun March 7, 1949, original plans having been shelved in 1941 due to interference by World War II. An estimated 2,160,000 man-hours have gone into its construction. Contract called for completion in 900 days. This schedule was met. Electrically, the building reflects a trend to power distribution at medium voltage to in-building load centers where power is transformed to utilization voltages, to low voltage switchgear of adequate interrupting capacity, to new standards of quantity and quality for lighting, to air conditioning, and to in-building elevator and escalator transportation.

COMPANIES AND PERSONALITIES

Owner	U. S. Government
Architects-Engineers	Design and Construction Division Public Buildings Service General Services Administration
General Contractors	John McShain, Inc.
Electrical Contractors	Joint Adventurers (Harry Alexander, Inc.; E. C. Ernst, Inc.; Howard P. Foley Co., Inc.)

MATERIAL SUPPLIERS

Conduit	General Electric Company
Wire and Cable	General Cable Corporation
Switches, Receptacles, Plates	Bryant Electric Company
Panelboards and Cabinets	Trumbull Electric Mfg. Co.
Switchgear, Transformers	General Electric Company
Controls	General Electric Company
Busduct	Trumbull Electric Mfg. Co.
Outlet Boxes	Steel City Electric Co.
Conduit Fittings	Crouse Hinds Company
Underfloor Duct	National Electric Products Co.
Lighting Fixtures (Offices)	The F. W. Wakefield Brass Co.
(Special)	Moe-Bridges Corp.
Fire Alarm System	The Autocall Co.
Clocks	International Business Machines Corp.

Your Contact With NPA

Capable industry specialists staff the Electrical Equipment Division of the National Production Authority. These specialists are your Washington contacts on production, allocation and priorities relating to electrical equipment and supplies.

ELECTRICAL equipment and supplies are recognized as necessary and urgently needed products for the defense mobilization program—for industrial plant expansion, and for defense, defense-supporting, and essential civilian uses. This recognition begins in the Office of Defense Mobilization, and obtains straight down the organization chart of the defense agencies through Defense Production Administration to the National Production Authority.

Within NPA is the Electrical Equipment Division, whose responsibility is the supervision of all production, distribution and priorities related to electrical equipment and supplies. EED is one of ten Divisions within the Industrial and Agricultural Equipment Bureau, and IAEB is one of the twelve Offices and Bureaus operating under the Office of the Administrator to form the National Production Authority.

The principal function of the Electrical Equipment Division is that of supervision of the production and distribution of electrical equipment and supplies needed for defense and essential civilian requirements. To do this, it must first determine what the requirements are, and second, see that adequate materials and components are made available to the producers to supply those requirements. The Division thus becomes the all-important single contact between procurement agencies, on the one hand, and the electrical products manufacturers, on the other.

Essential electrical products handled by EED are listed in the NPA Product Assignment Directory, and are thus the official CMP Class "B" products for which materials are allocated under the Controlled Materials Plan. These products and their Code designations are listed here according to the Branches to which they are assigned.

Because of the critical shortage of many materials, especially metals, conservation of these materials is sponsored by the Division. Conservation is urged through the use of substitute materials wherever possible, through simplification of products, through standardization of designs wherever practical, and through intelligent design and installation at the application level.

Unpredictable problems arise continually in each of the many segments of the electrical industry. To keep itself fully informed on these problems and their practical solution, and to keep the various branches of the industries involved fully informed on government requirements, materials shortages, etc., NPA has established a number of Industry Advisory Committees. The electrical industry Committees which have already been established are also listed here under the sponsoring EED Branch. The membership of each Committee represents a cross-section of the industry which it represents. Industry problems can be brought to the attention of NPA through these Committees, or directly with the Government Presiding Officer listed for each Committee. Individual problems, as differentiated from industry problems, should be taken up with the nearest NPA Field Office, or with the EED Branch chief in Washington for which the product involved is listed.

The Electrical Equipment Division, Branch, and Section officials are all industry specialists—Civil Service rates them as "Commodity Analysts"—and they are your representatives in the defense mobilization structure. They are entirely familiar with production and distribution problems on the products they handle. They also know red tape procedures within NPA and other Washington agencies, and are in a position to suggest or sponsor corrective action for individual or industry problems relating to these products. Their assistance is available on problems of production, procurement, priorities, and requirements. They are your contact with NPA.

ELECTRICAL EQUIPMENT

MOTOR AND CONTROL BRANCH

STerling 5200

S. H. Keller, *Chief*	X-3947
Miscellaneous Equipment Section	
H. G. Mitchell, *Chief*	X-4452
Motors and Generators	
R. L. Kingsland, *Chief*	X-3095
Expediting Section	
R. C. Wareham, *Chief*	X-3095

CMP Class "B" Product Codes:

Code No.	Product
36910	Storage Batteries
36120	Carbon and Graphite Electrical Products
36141	Fractional Horsepower Motors
36144	Motor Generator Sets and Other Rotating Equipment
36145	Land Transportation Motors, Generators and Control Apparatus
36162	Industrial Electrical Control Equipment
36163	Domestic Automatic Controls
3614291	Integral Horsepower Motors and Generators, Under 2000 kw.
3614392	Engine Generator Sets—750 RPM and above
3619391	Rectifying Apparatus
3619393	Miscellaneous Electrical Equipment

Industry Advisory Committees:

Name of Committee (Number of Meetings Held)	GPO*
Carbon Brushes Manufacturers (1)	H. G. Mitchell
Electrical Contact (2)	H. E. Way
Storage Battery Manufacturers — Industrial (1)	H. E. Way
Storage Battery Manufacturers (1)	H. E. Way
Fractional HP Motors and Generators**	S. H. Keller
1 to 500 HP Motors and Generators (1)	S. H. Keller
Large Motors and Generators — Above 500 HP**	S. H. Keller
Industrial Motor Control**	S. H. Keller

* — Government Presiding Officer

** — Committee formed, but initial meeting not held

OFFICE OF THE DIRECTOR

	STerling 5200
B. W. CLARK, *Director (left)*	X-3256
L. D. SHANK, *Deputy Director (right)*	X-3257
H. E. WAY, *Asst. to Director*	X-3350
C. G. LASLIE, *Staff Assistant*	X-4138

PROGRAM AND DISTRIBUTION BRANCH

	STerling 5200
R. H. St. John, *Chief*	X-5410
Statistical Section	
C. W. Mueller, *Chief*	X-4294
Auditing Section	
J. Kelly, *Chief*	X-4405
CMP Acceptance Section	
H. B. Findley, *Chief*	X-3298

The Program and Distribution Branch acts as a central clearing group for requests for Priorities assistance and for Directives initiated in or received by the Electrical Equipment Division. All CMP-4B applications filed by manufacturers for material allotments and authorization to make products listed under official CMP Class "B" product codes assigned to the Division are cleared through this Branch.

DIVISION — Industrial and Agricultural Equipment Bureau

LIGHTING AND INTERIOR DISTRIBUTION BRANCH

	STerling 5200
E. S. Milligan, *Acting Chief*	X-5657
Wiring Device Section	
L. Allan Sharp, *Chief*	X-4117
Lighting Equipment Section	
Berlon C. Cooper, *Consultant*	
Exterior Lighting Equipment	
Hugh Estes	X-4168
Residential Lighting Equipment	
John N. Payne	X-4129
Industrial and Commercial Lighting Equipment	
James H. Brundage	X-4138

CMP Class "B" Product Codes:

Code No.	Product
34711	Incandescent Lighting Fixtures
34718	Street and Highway Lighting Equipment
34719	Specialized Lighting Equipment
3471592	Fluorescent Lighting Equipment
36111	Current Carrying Wiring Devices
36112	Non-Current Carrying Wiring Devices and Supplies
36164	Fuses and Fuse Equipment, Under 2300 Volts
3616191	Low Voltage Distribution Equipment

Industry Advisory Committees:

Name of Committee (Number of Meetings)	GPO*
Aviation Ground Lighting (1)	Hugh Estes
Commercial and Industrial Lighting (1)	E. S. Milligan
Electrical Conduit (1)	L. Alan Sharp
Electrical Device and Outlet Box (1)	L. Alan Sharp
Electric Fuse (1)	E. S. Milligan
Floodlighting (1)	Hugh Estes
Residential Lighting (1)	John N. Payne
Low Voltage Distribution Equipment (2)	E. S. Milligan
Low Voltage Distribution Equipment** (3)	E. S. Milligan
Street and Highway Lighting (1)	Hugh Estes
Traffic Signals and Control (1)	Hugh Estes
Electrical Wiring Device (1)	L. Alan Sharp
Electrical Wiring Device** (1)	L. Alan Sharp
Electrical Contractors***	.....

* — Government Presiding Officer
** — Task group sponsored by Committee
*** — Committee formed, but initial meeting not held.

OUTSIDE DISTRIBUTION BRANCH

	STerling 5200
D. A. Griffith, *Chief*	X-3938
Pole Line Equipment Section	
R. C. Boyles, *Chief*	X-4260
Switchgear Section	
R. N. McCollum, *Chief*	X-3939
Transformer Section	
L. H. Walke, *Chief*	X-3939
Scheduling Engineer	
E. M. McManus	X-3939

CMP Class "B" Product Codes:

Code No.	Product
36113	Pole Line and Transmission Hardware
36151	Transformers
3616192	High Voltage Switchgear and Switchboard Apparatus
36192	Capacitors for Industrial Use

Industry Advisory Committees:

Name of Committee (Number of Meetings Held)	GPO*
Power Transformer and Distribution Transformer (1)	H. E. Way
Power Switchgear and Power Circuit Breaker (1)	H. E. Way
Power Switching Equipment (1)	H. E. Way
Fluorescent Lamp Ballast (1)	L. D. Shank

*Government Presiding Officer

The National Production Authority Organization

Code	Organizational Unit
ADM	Office of the Administrator
AAA	Office of Assistant Administrator for Administration
GC	Office of General Counsel
OPI	Office of Public Information
OSB	Office of Small Business
OLR	Office of Labor Requirements
OCR	Office of Civilian Requirements
PCB	Policy Coordination Bureau
CRFP	Chemical, Rubber & Forest Products Bureau
FCB	Facilities and Construction Bureau
IAEB	Industrial & Agricultural Equipment Bureau
MMB	Metals and Minerals Bureau
TLSE	Textile, Leather & Specialty Equipment Bureau

BLAST OF AIR from compressor line flushes out lighting conduits in a railroad roundhouse building.

HUNDREDS OF MOTORS from flooded plants await cleaning and drying in parking lot of Independent Electric Machinery Co. Cat-boom brings units to cleaning platform where water and steam wash out caked mud.

THOROUGH SCRUBBING with carbon tet and dry cloths is given bus system in air conditioning control panel.

After the Disastrous

Greater Kansas City electrical contractors and motor repair shops cooperate to rehabilitate elec-

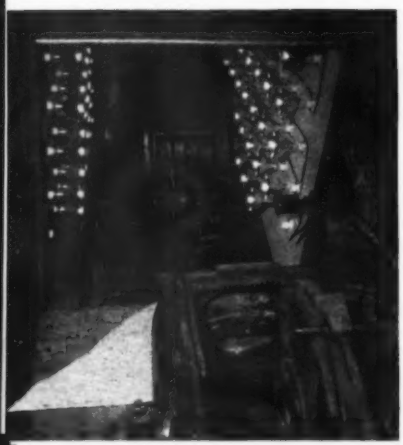
By August Eckel

AFTER four days of fighting the raging waters of the Kaw and Missouri Rivers, plus "floating" fire which razed a five-block business area, Greater Kansas City looked down on eleven square miles of its area under 10 to 20 feet of swirling, silt-laden water. Greater in magnitude and devastation than the 1903 flood, this July disaster hit the rich Fairfax, Armourdale and Central industrial districts a paralyzing blow. More than a thousand plants (large and small) in the lowlands were either completely or partially submerged. Estimated damage runs into the hundreds of millions of dollars.

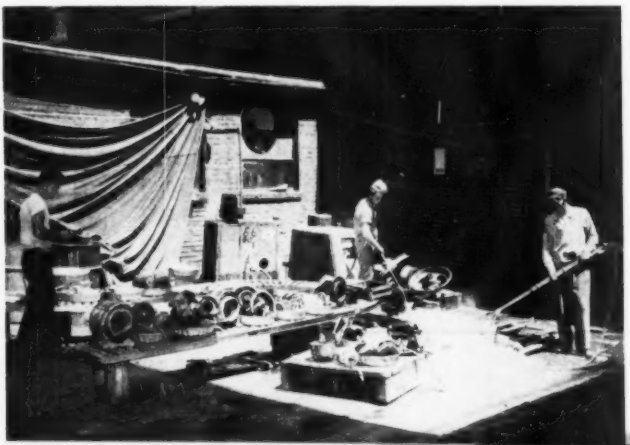
Stunned industrials immediately began to plan digging-out and drying-out programs. When the waters had receded sufficiently to permit closer inspection, plants found that the worst damage was the water-soaked electrical equipment. Without it, not a wheel could be turned.

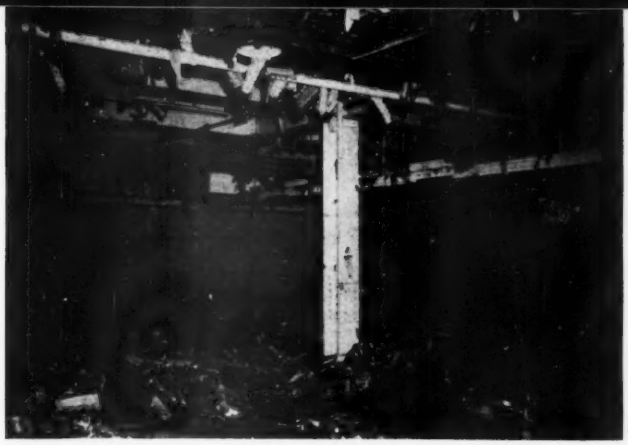
An alert Kansas City electrical industry was ready to meet the situation. Three days after the dikes broke, the Board of Directors of the Greater

INFRA-RED HOOD was used by Boese-Hilburn Electric Company to dry out a 100 hp. stator and armature.

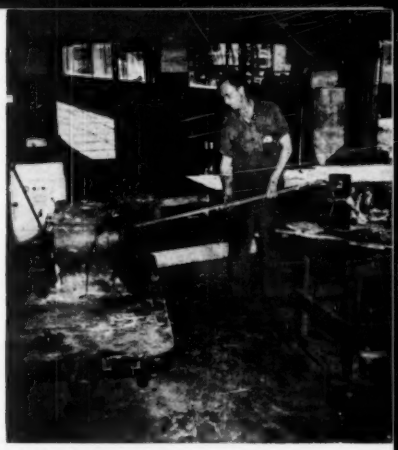


PRODUCTION-LINE SETUP at Boese-Hilburn Electric Co., begins at cleaning area in service alley. Following steam cleaning, motors enter rented building on conveyor; go through baking, assembly, testing and painting at rate of 100 per day.





UNDER WATER for about a week, feeder bus duct in this baking plant was draped with soggy biscuit cartons when water receded. Duct had to be cleaned and dried out. Ingenuity of maintenance and repair crews speeded this giant salvage project.



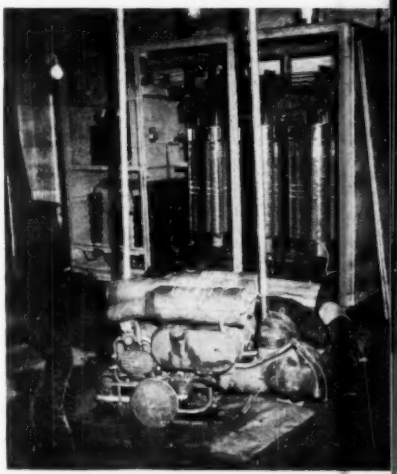
MOTOR REPAIR AREA was set up on main floor of this fibre-glass plant. Compressed air and steam cleaned motors.

Kansas City Flood

trical systems of inundated plants—improvise techniques and facilities to get industry back on its feet.

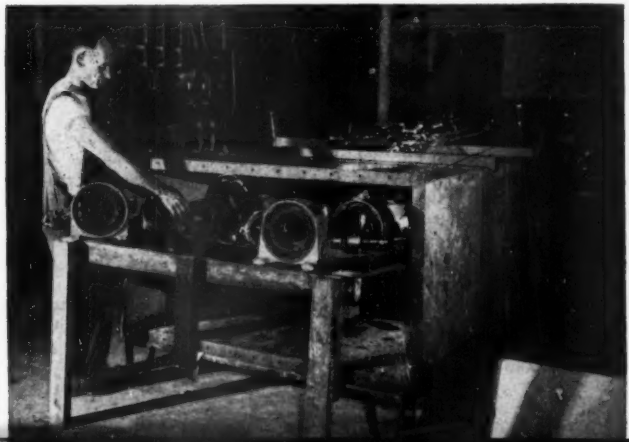
Kansas City Chapter, NECA, met and instructed its 33 electrical contractor members to divert all materials and manpower to flood rehabilitation work which was to take precedence over all other jobs. Work was to be done as economically as possible, preferably on a time and material basis to save normal estimating time. Emergency calls came first. Contractors too busy to do more of this work were to refer such calls to the NECA office where they would be relayed to another contractor. Manpower requests were handled by the NECA office to better coordinate the emergency plan.

Cooperating in the all-out rehabilitation effort were 13 motor repair shops (many of them NISA members); 10 electrical wholesalers who would supply materials; and Local 124, IBEW which lowered all jurisdictional bars and urged its 1,600 members to work side by side with plant electrical maintenance crews regardless of Union affiliation. The public was apprised of this cooperative plan through a half-page ad in the Kansas City Star listing the contractors and motor shops and urging flood-stricken industrials to contact their regular contractors and service shops. The

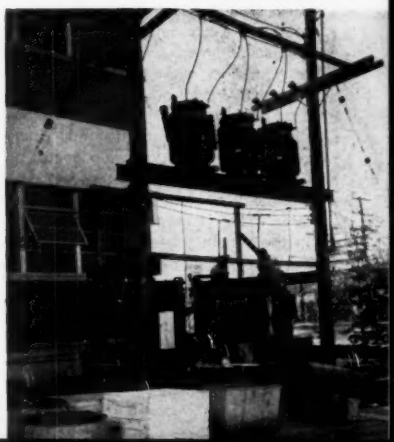


AIRCRAFT CABIN WARMER blows hot air around one of two 1,000-kva, 3-phase, 113kv/440v, air cooled transformers.

METAL HOPPER on its side forms oven to dry out motors in small plant. Portable oil-burning heater blasts hot air through neck of hopper at rear. Improvised rack holds motor parts. Work by Evans Electrical Construction Company.



TEMPORARY TRANSFORMER BANK gets biscuit plant into partial operation while submerged units are being dried out.



BOOT-CLAD ELECTRICIANS remove relays and meters in cubicle which was completely submerged.

CLEANED, BAKED, TESTED and painted, motors leave a motor shop for return to flood-stricken industrial plant. Union and independent electricians worked side by side in their praiseworthy endeavor to restore service.

HEAT LAMPS DRY OUT cable terminals at bank of starters in grain elevator. Starters have been removed and sent to manufacturer's service station for repair.

COMPRESSED AIR was used by Crescent Electrical Company to force water and silt out of conduit stub-up in transformer room of a grain mill.

CARBON TET SPRAY helps clean and dry motor starter terminals and contacts in grain elevator. Sealing fittings prevented excessive silt from entering starter.

city electrical inspector issued permits by phone to save time. The blueprint of emergency operation was ready. The rest was up to the ingenuity of the individual contractors and motor shops.

As soon as plants could be entered, boot-clad electricians sloshed through sour-smelling water and muck to remove motors, starters, circuit breakers, meters and other control equipment and send them to motor shops and manufacturers' regular and emergency service stations. To speed up the work, motor repair areas were established on plant premises in some cases. Then contractors concentrated on their main job—cleaning and drying the complete electrical system from service entrance down to the most remote outlet. The time required varied with different plants depending upon the degree of damage and height of water. As more and more damaged equipment was uncovered, the call went out for 400 more electricians from surrounding states to supplement the 1,600 already available. It was rough going on a slow and tedious job under the most unfavorable working conditions.

Motor shops received mud-soaked motors by the truckload; converted alleys and parking lots into storage and cleaning areas; set up temporary production-line operations to turn out 50 to 100 motors daily; used every available heating method to dry out units.

Contractors used everything from the lowly rag and wire-brush to carbon tetrachloride sprays, steam generators, compressed air, infra-red lamps and portable oil-burner heaters to clean and dry switches, bus bars, raceways, transformers and cables. That, plus the physical stamina of the mechanics.

Latest reports indicate that most of the flooded electrical equipment stood up well and responded to the drying-out processes. A surprisingly small amount of new materials was required and only a few motors had to be rewound. Replacements were necessary primarily where equipment and materials were of the old type and had been previously overloaded.

The teamwork of Kansas City's electrical industry received the justified commendation of flood-stricken industries, some of which were back in partial operation within three weeks or less. How this was accomplished by contractors and motor shops is here illustrated. It was a slow, messy, strenuous job and all concerned vow they never want to go through it again.

Keep Customers Demanding YOUR Electrical Services

Lasso Sylvania's Business Building Program

AND PUT IT TO WORK IN YOUR LOCALITY

BUILDING YOUR BUSINESS!

Make this famous nationally-advertised emblem *your* emblem . . . in *your* locality . . . by putting it on your truck, your window, your stationery.

It identifies you as the Electrical Contractor who handles the Sylvania quality line of fluorescent tubes and fixtures. Since quality products go with quality workmanship, this Qualified LIGHTING CONTRACTOR emblem is your customers' assurance of expert electrical service!

QUALIFIED
LIGHTING CONTRACTOR
SYLVANIA
SALES + SERVICE

THIS EMBLEM will be seen in full-page ads in TIME, NEWSWEEK, BUSINESS WEEK, THE MAGAZINE OF BUILDING and in many other magazines reaching your factory and commercial prospects. It will make them look to this emblem as the sign of dependable service. In addition, Sylvania is backing you this year with the most powerful consumer advertising program in its history in the *Saturday Evening Post*, *American Weekly*, and *This Week*.

Bud Collyer, on the big nation-wide TV show "Beat the Clock," also tells his great audience about the expert work of the man who displays the Qualified Lighting Contractor sign.

COLORFUL, BUSINESS BUILDING CAMPAIGNS WILL BE MAILED TO ALL YOUR PROSPECTS!

Each of these mailings sell only *your* services, *your* knowledge, *your* workmanship. Only the emblem appears, plus your name, address and telephone number on each piece.

You merely furnish your mailing list, the required number of letterheads, and pay 1¢ per name per mailing. Then Sylvania sends the mailings out once *each month* to your prospects in:

1 **Factories, Stores and Offices.** There are 6 separate mailing pieces that sell your services, build demand for you in your locality.

2 **Architects.** There are 3 separate mailings offering your cooperation and installation knowledge to this important group.

3 **General Contractors.** There are 3 mailings designed to broaden your recognition and quality workmanship among this important group.

When you join this Business Building Program —
You receive the Business Building Kit containing the emblem for *identifying you* as the Qualified Lighting Contractor.

You receive local advertising materials plus a new book on "How to Plan and Sell a Fluorescent Installation."

BUILD NOW FOR THE FUTURE. BUILD A DEMAND FOR YOU AND YOUR SERVICES MAIL THE COUPON FOR COMPLETE DETAILS!

SYLVANIA

FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; PHOTOLAMPS; TELEVISION SETS

SYLVANIA ELECTRIC PRODUCTS INC. 1901–1951 FIFTY YEARS OF PROGRESS 50th ANNIVERSARY

Sylvania Electric Products Inc.
Dept. L-6109, 1740 Broadway, New York 19, N. Y.

Please send me full details and illustrated folder about Sylvania's big Promotion Program for Electrical Contractors.

*Name*_____

*Street*_____

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*862 years

OF ELECTRICAL EXPERIENCE

GraybaR

Officers and District Managers all began "In the Ranks"

Experienced men make an experienced organization—one that can be relied upon to serve you well.

Graybar, oldest and largest distributor of "everything electrical", has long since proved the soundness of this principal by continually filling key company posts from within.

The result? An experienced, close-knit management group who—as clerks, office boys, and salesmen—*themselves* helped build the foundation for Graybar's ever-growing list of customers.

It's easy, then, to see why—with the same opportunities for advancement—each and every Graybar employee has a powerful incentive to do his job well.

Graybar is totally owned by its operating and retired personnel. That's another reason why every Graybar employee is personally interested in meeting your electrical needs accurately, helpfully, and as rapidly as possible. *Graybar Electric Company, Inc., Executive Offices: Graybar Building, New York 17, N. Y.* 185-49

A. H. NICOLL
President
Started 1911, as Sales Record Clerk

G. F. HESSLER
Vice President
Started 1906, as Clerk

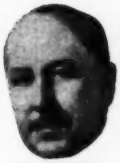
E. W. CASHMAN
Vice President
Started 1913, as Clerk

W. E. HENGES
Vice President
Started 1913, as Receiving Clerk

A. C. LAMPERTI
Secretary
Started 1920, as Bookkeeper

R. B. WILKINSON
Treasurer
Started 1915, as Errand Boy

L. G. FIELDS
Richmond District Manager
Started 1924, as Warehouseman



W. FRAZIER
Kansas City District Manager
Started 1911, as Office Boy

W. E. GUY
Chicago District Manager
Started 1924, as Salesman

A. D. HAMMOND
Atlanta District Manager
Started 1906, as Clerk

R. W. KIMBERLIN
San Francisco District Manager
Started 1922, as Sales Record Clerk

C. E. KIRKPATRICK
Cleveland District Manager
Started 1936, as Quotation Clerk

J. P. LAWTON
Seattle District Manager
Started 1923, as Warehouseman

G. T. MARCHMONT
Dallas District Manager
Started 1908, as Service Clerk

E. E. MARTIN
Boston District Manager
Started 1920, as Service Clerk

J. A. MAYER
Philadelphia District Manager
Started 1913, as Equipment Installer

C. H. McCLEAN
Minneapolis District Manager
Started 1913, as Warehouseman

HERBERT METZ
New York District Manager
Started 1914, in Student Course

C. S. POWELL
St. Louis District Manager
Started 1914, in Student Course

R. B. SAYRE
Jacksonville District Manager
Started 1921, as Warehouseman

S. W. SCOTT
Los Angeles District Manager
Started 1928, as Salesman

D. WALLACE
Pittsburgh District Manager
Started 1922, as Assistant Accountant

L. B. WESTFALL
Cincinnati District Manager
Started 1916, as Service Clerk

E. R. YONKERS
Detroit District Manager
Started 1933, as Salesman

V. A. ELMBLAD
Dallas Assistant District Manager
Started 1920, as Warehouseman

J. E. FONTAINE
Houston Assistant District Manager
Started 1928, as Warehouseman

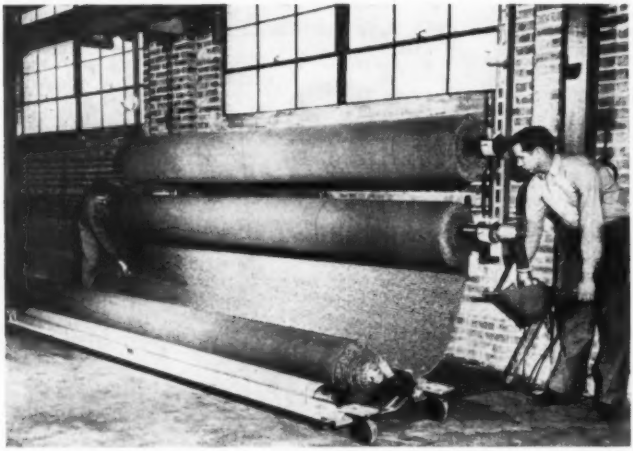
***AVERAGE SERVICE 34 YEARS**

100,000 first-quality electrical items are distributed throughout the nation...

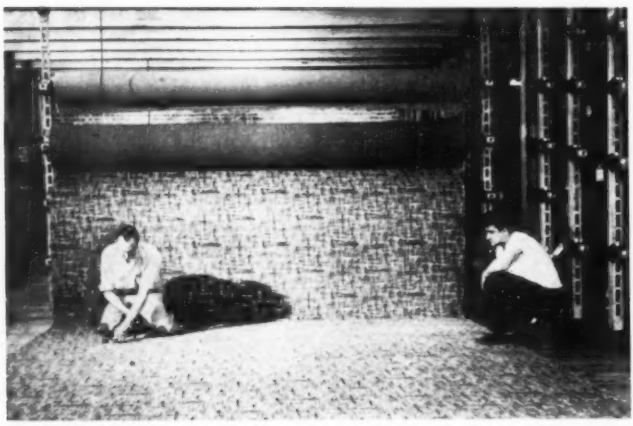
via GraybaR

IN OVER 100 PRINCIPAL CITIES

Practical Methods



RE-ROLLING OF CARPET for cut-order storage is done on special tubes rotated by right-angle gear attachment on standard heavy-duty electric drill. Re-roll racks are on monorail suspension, can be easily removed.



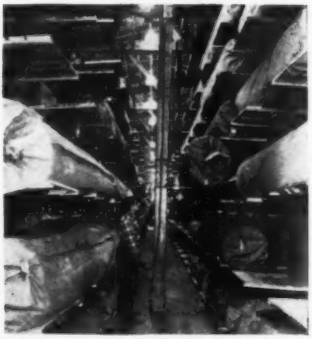
MONORAIL RACKS are pulled out from storage area bordering cutting floor. Carpet on racks is unrolled and cut to specified lengths for cut-order requirements.

Power Units Speed Carpet Handling

MATERIALS HANDLING

Bigelow-Sanford Carpet Company's new Chicago warehouse, reportedly one of the largest and most completely mechanized of its type in the country, is a single-story, brick and concrete structure designed for maximum efficiency in operations. Contributing to the attainment of such efficiency are the following mechanized facilities: traveling electric cranes; carpet rolling machines; overhead trolleys for inter-department shipments; portable electric elevators; track-suspended service racks; and a conveyor line to speed machine binding.

Outstanding example of material handling efficiency and space conservation is the bulk storage area which holds from 1,900 to 2,000 full carpet rolls—approximately a quarter million square yards of carpet—with each roll allocated to its own storage space. By installing two overhead bridge cranes with column-type fork lifts, aisle widths were held to 54 inches. If rolls were handled by fork lift trucks, designers estimated aisles would have to be about 17 feet wide.

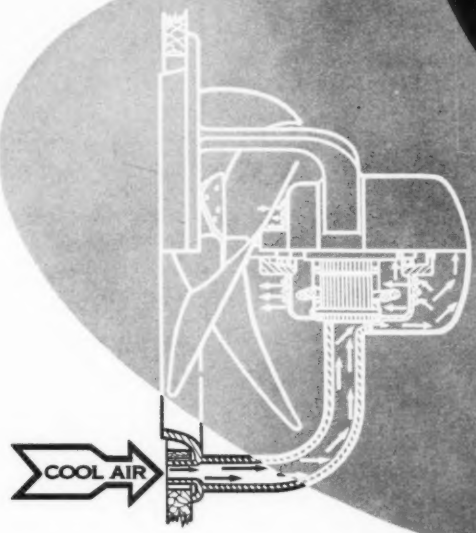


ELECTRICALLY OPERATED column-type fork lifts permit one man to rack heavy rolls of carpet in the bulk storage area. Fork-column rotation of 360 degrees allows servicing both sides of the 54-inch aisle. Rolls are moved in and out of aisles lengthwise.

The two one-ton cranes run the full length of the storage area, each servicing four aisles. Carpet rolls are placed on or removed from the storage racks by a column-type lift fork suspended from the crane bridge. Both crane and lift are electrically operated; the crane traveling at the rate of about 125 feet per minute; the lift at about 18 feet per minute. The fork column can be rotated 360 degrees around its vertical axis so it can serve both sides of the aisle. Crane operation is a one-man job. By means of a multiple-button control station at the end of a heavy-duty rubber-covered cord connection, the operator can move the bridge in a forward and reverse direction and the fork up and down. These cranes pick up shipments at the indoor railroad port and service them through all bulk storage operations.

Another important time-saver at the B-S Chicago warehouse is the electric re-roll of carpet scheduled for the cut-order department. Special re-roll tubes are set on monorail racks. The original roll of carpet, on a roller dolly, is positioned in front of the monorail rack. The re-roll tubes are rotated by a right-angle gear attachment to a standard ¾-inch heavy-duty electric drill. As the tube rotates, the carpet is re-rolled,

patented ILG self-cooled motor...



...designed specifically for exhaust fan duty

When fan is operating, clean, cool, fresh air is drawn through the vent pipe from OUTSIDE, circulated through the motor, then exhausted from front of motor. Motor stays clean, cools itself—none of the foul air from the polluted air stream of the exhaust fan reaches it to interrupt service, shorten its life. You get the *low operating cost* of an open-type motor with the *protection* of a closed-type motor.

ILG

REG U.S. PAT. OFF.

...just one of many exclusive ILG features!

• There are good reasons why ILG Propeller Fans have gained an enviable international reputation for outstanding efficiency, economy, minimum maintenance, and long life.

Motors have special operating characteristics for fan duty. Direct-connection of motor and fan wheel assures permanent alignment. Patented new type Q fan wheels are scientifically shaped and positioned to exhaust a large volume of air quietly, with greater efficiency (see certified ratings—NAFM and/or PFMA labels, also decibel ratings). Streamlined air inlet surface of rugged frame accelerates rapid flow of air. Each fan covered by ILG's "One-Name-Plate" guarantee, including the motor. Full range of sizes and capacities. For latest data, phone nearby Branch Office or write us.

VENTILATION

Free! Engineering data bulletin 149-1 contains all essential data—sizes, capacities, dimensions, ratings. Send coupon now.

☐ Send free bulletin 149-1.

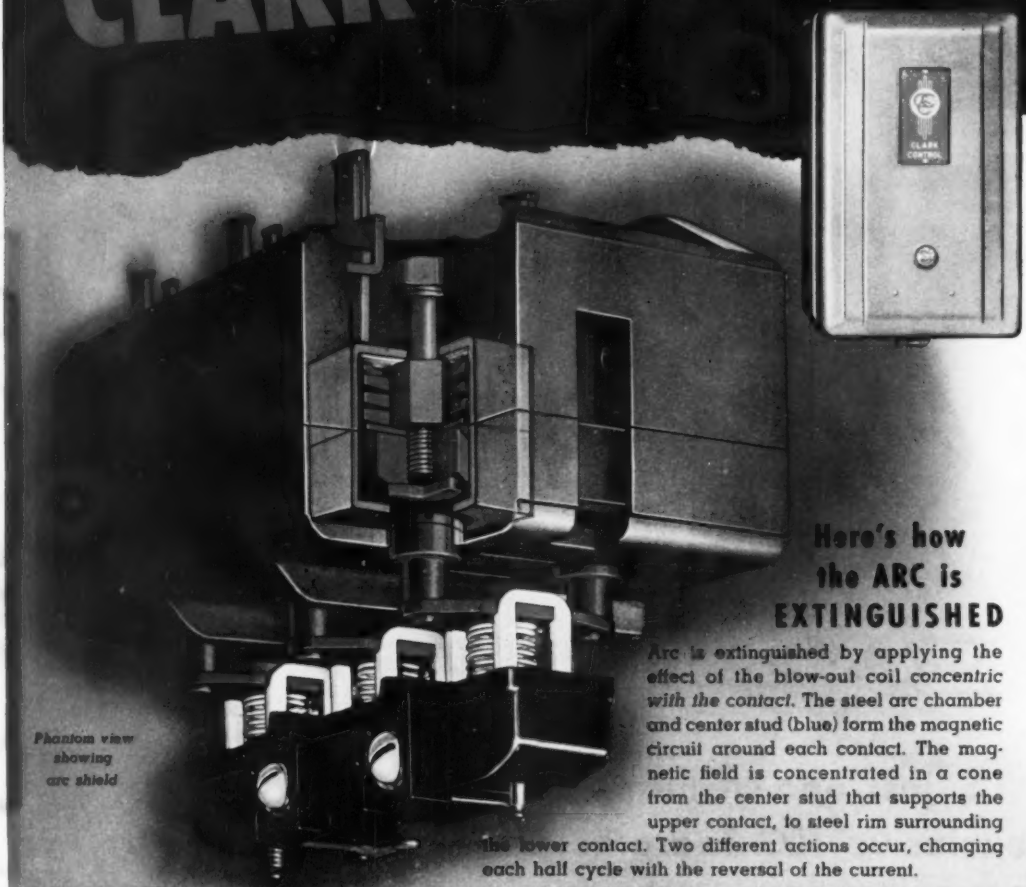
*Firm Name*_____

*Individual*_____ *Title*_____

*Address*_____

*City*_____ *State*_____

The All New CLARK TYPE "CY" AC MOTOR



Phantom view showing arc shield

Here's how the ARC is EXTINGUISHED

Arc is extinguished by applying the effect of the blow-out coil *concentric with the contact*. The steel arc chamber and center stud (blue) form the magnetic circuit around each contact. The magnetic field is concentrated in a cone from the center stud that supports the upper contact, to steel rim surrounding the lower contact. Two different actions occur, changing each half cycle with the reversal of the current.

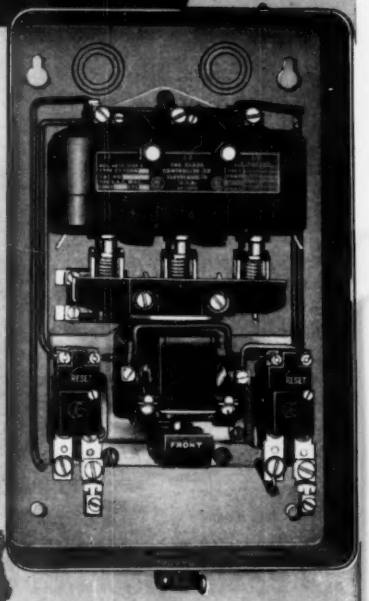
In one current direction the arc is forced to the outer edge of the upper contact, lengthened and rotated. In the other, the arc is rotated and forced to the middle of the upper contact. In each case, the magnetic field tends to quench the arc, either by lengthening it or confining it.

Constant forced rotation of the arc, moving continually from a hot to a cold spot, minimizes burning and pitting of contacts.

Available Through **CLARK** *Distributors.*

CLARK ENGINEERED ELECTRICAL CONTROL

— STARTER features an entirely new principle in ARC INTERRUPTION



Another CLARK First! In the Type "CY," CLARK offers, for the first time, a line of AC Motor starters that gives you the extra protection of "Mill-Type" heavy-duty construction and design. These new starters feature the combined use of strong multi-turn magnetic blow-outs and twin-break contacts* to achieve a new high in arc-interrupting efficiency.

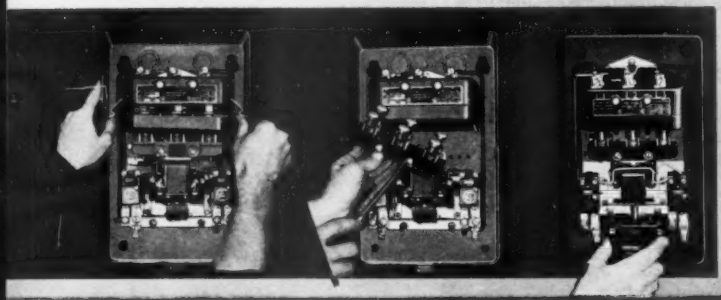
Other important advantages include:

- One piece upper arc shield, closed at the top, to prevent accumulation of hot gases between wiring terminals, minimizing phase-to-phase failures.
- Magnetic arc interrupters in steel arc chambers.
- Silver alloy double break contacts.
- Melting-alloy type overload relays.
- Vertical-lift clapper type magnet with straight line guided movement, using no springs.

*Magnetic blow-out coils are used on all Size 2 and 3 "CY" Starters. Sizes 0 and 1 use the same general Mill-Type construction as larger sizes.

The Maintenance Man's Dream

The new arc interrupting principle and twin-break silver-alloy contacts, assure longer contact life. No filing, dressing or cleaning of contacts is required. Inspection and maintenance are further simplified by design features.



- No tools needed to inspect contacts.
- Moving contacts easy to change.
- Stationary contacts quickly changed.
- Remove only two screws and one pin to change coils.
- All parts removable from the front.

THE CLARK CONTROLLER CO.

1146 EAST 152ND STREET · CLEVELAND 10, OHIO

for easier and better work...keep all three tapes on hand

it takes

NOT ONE...NOT TWO ...but ALL THREE ELECTRICAL TAPES

to meet electrical insulating requirements

the "Dutch Brand" trio

● No one tape can do all jobs—it takes the *correct* tape or the right *combination* of tapes, depending upon specifications and requirements.

DUTCH BRAND insulating tapes are made by specialists in electrical tape manufacturing, experienced through years of close association with the electrical industry. These men have a full understanding of electrical insulating problems. It is this experienced background that has produced these high quality DUTCH BRAND electrical tapes, so well known for over forty years.

That's why we repeat, it takes NOT ONE ... NOT TWO ... but ALL THREE electrical tapes to meet requirements.

ORDER ALL THREE FROM YOUR JOBBER

DUTCH BRAND

VAN CLEEF BROS. INC.

Manufacturers ..... Rubber Products ..... Est. 1910

7800 WOODLAWN AVENUE • CHICAGO 19, ILLINOIS

then moved by monorail to the cut-order department. The same drill and attachment can be used for any number of re-rolls; is plugged into nearby convenience outlet.

The re-rolled carpets are stored, on the monorail racks, in areas bordering the main cutting floor. Parallel rows of monorails create the storage area. When a cut-order comes up, the specified monorail rack is pulled out over the cutting floor and the carpet unrolled and cut to length. A roller conveyor line between machines speeds carpet binding.

Completing the facilities at this warehouse structure is a modern air-conditioned, fluorescent illuminated office area with the latest in bookkeeping and tabulating equipment; also an employees' lunch room and first aid station.

Cooling Tables Speed Rotor Assembly

PRODUCTION

In the manufacture of large motors, rotor coils are placed in an insulating fixture and insulated between turns. Then coil and fixtures are placed in a press and shaped to proper dimensions. The fixture is then tightened and the coil is heated to a temperature of approximately 300 degrees F. After removal from the press, the coil must be left in the fixture until it cools to 100 degrees F.

Formerly, this cooling process at the Allis-Chalmers Manufacturing Company, Milwaukee, Wis., consisted of playing a stream of compressed air on the inside of the coil. Normally, this required as much as three hours time

COILS ARE COOLED by blast of air from fan inside enclosure. Large tables have two fans. Cooling time has been cut by two-thirds.

1. A big advance in masonry bolt anchors. The RAWL HAMMER-SET is simple in construction, but powerful in effect.

2. RAWL HAMMER-SETS consist of a sleeve and nut held together by perfect precision taper friction.

3. The sleeve is formed with one vertical slot extending its entire length, which opens or closes according to variations in the diameter of the hole in masonry.

4. Due to the absence of lead, there is no creeping, maximum load being sustained without slipping.

5. RAWL HAMMER-SETS will hold anywhere in the hole—flush with surface—below surface or in bottomless holes . . . They are ideal for making fastenings to floors having a hard surface, but cinder mix or poor concrete underneath.

6. Additional expansion is secured when bolt is turned home, drawing nut into sleeve.

WHY CAULK IT? JUST HAMMER IT HOME!

Approved by Underwriter's Laboratories, Inc. for Electrical and Sprinkler Installations.

For further information write Dept. E

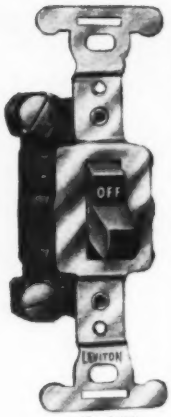
12-1-4

THE RAWLPLUG COMPANY, INC.
271 CHURCH STREET • NEW YORK 13, N. Y.

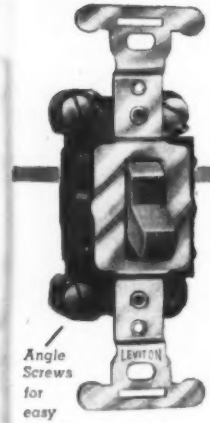
THERE ARE RAWL . . . EXPANSION BOLTS, SCREW ANCHORS AND MASONRY DRILLS FOR EVERY NEED
SOLD THROUGH ALL LEADING HARDWARE, ELECTRICAL AND MILL SUPPLY HOUSES

. . . and NOW!

20 Amp. Switches in the 5000 Line



No. 5011



Angle Screws for easy wiring
No. 5013

. . . another ***heavy duty*** *product in the* ***5000 Series***

Rated: 20A.-125V.; 10A.-250V.

A new design. Strong bakelite cup rivetted to strap. Top wiring with large terminal screws to take up to #10 wire. Wiping contacts with snuffer action. Wide plaster ears. Close fitting toggle clearly marked — in brown or in ivory.

An outstanding switch for industrial or residential use.

LISTED AS STANDARD BY UNDERWRITERS LABORATORIES. CANADIAN STANDARDS ASSOC. MEETS FEDERAL AND R. E. A. SPECIFICATIONS.

for **Heavy Duty** jobs use the **Leviton 5000 Series**...

LEVITON

LEVITON MANUFACTURING COMPANY
BROOKLYN 22, NEW YORK
warehouses: Chicago and Los Angeles

OFFICES IN ALL PRINCIPAL CITIES

for a large coil. Now, through the ingenuity of two electrical assemblers, Ralph Marchetti and George Novoselac, this time has been reduced by two-thirds.

Marchetti and Novoselac suggested the construction and use of cooling tables with vertical-shaft electric fans to force cool air up through a top grate and over the coil.

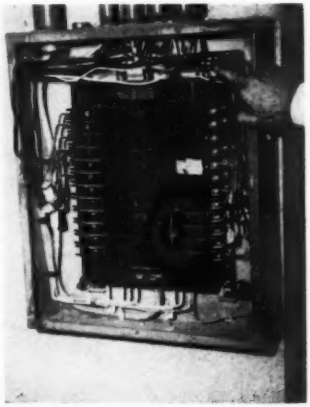
Two tables are being used, one three feet and the other six feet in length. They have angle iron frames three feet wide and three feet high. The four sides are screened to a height of one foot from the floor; sheet steel extends from the screen to the tops of the sides. Tops consist of an open grating made of $\frac{1}{4}$ by $2\frac{1}{2}$-inch steel strips and can be lifted out of the frame. Mounted one foot below the grating is a vertical-shaft fan driven by a $\frac{1}{4}$-horsepower electric motor. The six-foot table has two fans. A light screen protects fan and motor from objects that might fall through the grating. A handy short-stop control is on the side of the table; has a flexible cord connection.

Circuits Coded By Color and Number

CONSTRUCTION

To insure the absence of errors in connecting lighting and power circuits in New York's new Port Authority Bus Terminal, branch circuits are multi-colored for rapid general identification, and adhesive numbered bands are affixed for positive classification.

Panels were specially constructed, with wide wiring gutters, singlepole quick-lag thermal-type breakers, 120/208-volt 3-phase 4-wire service and dead-front enclosures.



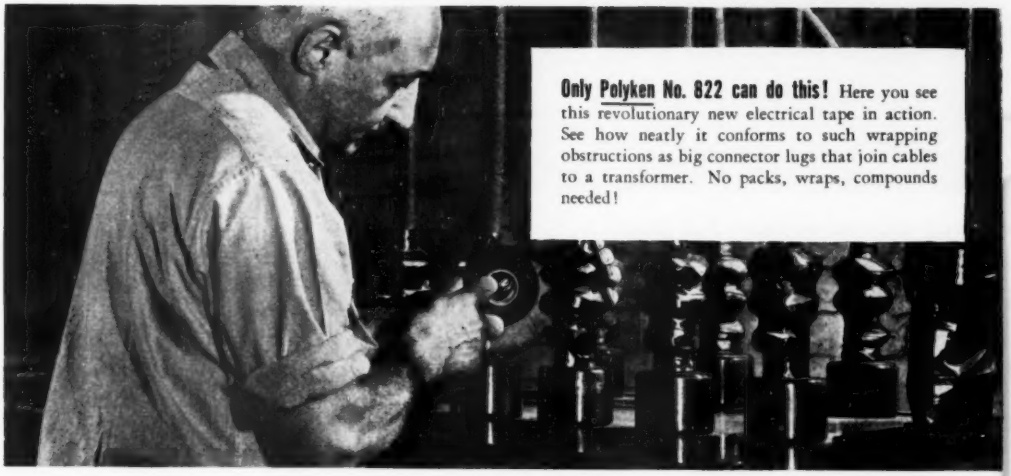
ADHESIVE BANDS positively identify branch circuits, while colored wires permit rapid classification of services during period of connections.

THE NEW

Polyken®

INDUSTRIAL TAPES

TAILORED TO YOUR JOB



Only Polyken No. 822 can do this! Here you see this revolutionary new electrical tape in action. See how neatly it conforms to such wrapping obstructions as big connector lugs that join cables to a transformer. No packs, wraps, compounds needed!

Now wrap high-tension cables in ONE easy step!

Until *Polyken* No. 822 was developed, wrapping high-tension cables was a two-step job. First, a rubber splicing compound, followed by an outer wrap of friction tape.

Now you can forget about the rubber compound! *Polyken* Electrical Tape No. 822 is only 9 mils thick—but it's 10,000 volts strong (dielectric strength). Makes *one* quick operation out of two tedious ones with no sacrifice of efficiency.

No. 822 is the only oriented polyethylene tape with a successful pressure-sensitive adhesive. Stretches both ways, so that it covers rough and irregular surfaces. High moisture resistance. Solvent proof. Corrosion proof.

For splicing, wrapping, insulating, corrosion coating of cables, wires, controls, pipes, conduits, and hundreds of other uses. Write for free samples today!

Polyken, Dept. ECJ, 222 West Adams St., Chicago 6, Ill.

For specifications and further information on this and other Polyken tapes, please send me your *FREE BOOKLET*, "Tape is a Tool."

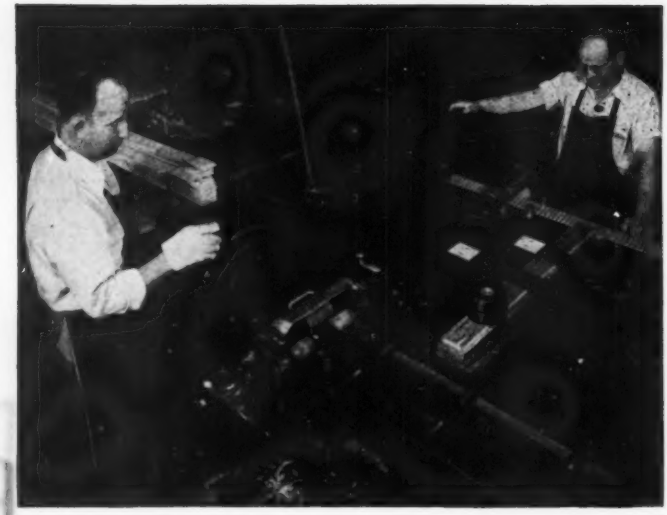
Name_____ Title_____

Company_____

Street Address_____

City_____ Zone____ State_____

Polyken Industrial Tape, Department of Bauer & Black, Division of The Kendall Company



On UL labeled outdoor Bus Ducts . . .

Bus bars protected with plastic tape!

Ventilated "LO-X" of BullDog Electric Products Company won the first UL label for outdoor use of Bus Duct. Bus bars are wrapped with "SCOTCH" Electrical Tape No. 22.*

Bus bars of Weatherproof "LO-X" Duct are wrapped in "SCOTCH" Electrical Tape No. 22. Previous insulating material was difficult to handle and apply. New tape is mechanically wrapped on straight lengths up to 10 feet—gives excellent appearance and first class performance.

When *you* need insulation that resists moisture, alkalies, acids and oils try this tough new plastic-backed tape. Dielectric strength is over 10,000 volts, yet this sleek, super-thin tape is only .010 inch thick. Stretches snugly around odd shapes. Stick-at-a-touch adhesive gives moisture-tight seal—keeps weather out, prevents corrosion.

Order "SCOTCH" Electrical Tape No. 22 today from your wholesaler. Or write Minnesota Mining & Mfg. Co., Dept. EC-951, St. Paul 6, Minn., for booklet giving you all the facts.

*Refers specifically to Underwriters' Laboratories listed busway of Bulldog Electric Products Co. having bus bars wrapped with a tape insulation that is highly resistant to dampness and moisture.

Quick Facts about "SCOTCH" Electrical Tape No. 22

- **TOUGH**— plastic backing is abrasion-resistant, unaffected by water, oil, acids, alkalies, sunlight.
- **STRETCHY**— conforms to any surface.
- **HIGH DIELECTRIC**— over 10,000 volts.
- **DEPENDABLE**— won't dry out.

SCOTCH BRAND Electrical Tape No. 22

The term "Scotch" and the plaid design are registered trade-marks for the more than 100 pressure-sensitive adhesive tapes made in U.S.A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn.—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-slip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: Minn. Mining & Mfg. Co., International Division, 270 Park Avenue, New York 17, N. Y. In Canada: Minnesota Mining & Mfg. of Canada, Ltd., London, Canada.

Hi-Pot Unit Tests Rubber Gloves

PRODUCTION

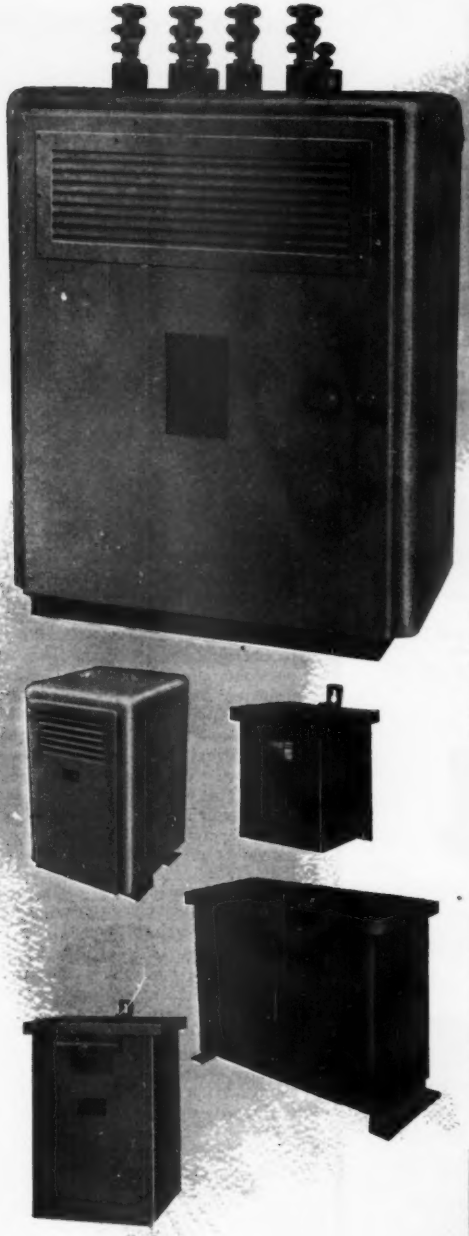
Manufacturers and large users of linemen's rubber gloves are extremely careful to put each pair through rigid tests to detect faulty construction and workmanship. Although the end results are the same in all cases, individual techniques vary.

One attempt to establish a standard performance test procedure has been made by F. R. Hannon & Sons, manufacturing subsidiary of the Hannon Electric Company, motor repair specialists of Canton, Ohio. Hannon engineers have developed and built several high potential rubber glove test units which feature safety and automatic control and timing.

The test equipment includes a high-voltage transformer (25,000 volts in unit illustrated), tank for water, movable glove rack with test electrodes and facilities for filling each glove with water, automatic electric timing circuits for controlling test, meter circuits to measure current flow through gloves, and a screened enclosure which is automatically locked during test. All circuits and parts are grounded with the exception of the tank which is "hot" during the test. When the access gate lever on the enclosure is in the open position, the tank is automatically grounded.

The high-voltage transformer is of special design and built so it will not, in any way, distort the wave form of the test voltage. A special voltmeter coil is wound on the transformer core. All high-voltage connections are kept

OPERATOR FILLS rubber gloves with water after they have been clamped into position on test rack. Fill pipes extend through tubular electrode in each glove. One lever controls valves for two gloves. All circuits are off and tank is grounded when access gate is open.



MORE KVA PER POUND!

Lightweight, dry-type transformers save space, cut installation costs. 3 through 167 kva, single phase, or 9 through 225 kva, three phase.

They're lighter and smaller! Compact, completely ventilated coils on Hipersil® cores—neatly enclosed in sheet steel cases for convenience of mounting, cleanliness, trim appearance.

Add all this to the savings inherent in dry-type transformer design:

NO VAULTS. Mount them on the floor, walls, posts or overhead platforms, close to the load they serve. They're safe.

SIMPLIFIED MAINTENANCE. No liquids to store, filter or replace. No gauges, radiators, valves or gaskets to get out of order.

Westinghouse Dry-Type Transformers are available for voltage step-down or step-up applications or for phase changing. Types AJRB and AVRB (3 through 100 kva) have circuit breakers built into the high-voltage circuit, giving 3-way protection against damaging overloads or short circuits, cutting installation time up to 50%. Ask your Westinghouse representative for a copy of B-4428, or write Westinghouse Electric Corporation, P. O. Box No. 868, Pittsburgh 30, Pennsylvania. J-70607

YOU CAN BE SURE... IF IT'S

Westinghouse

DRY-TYPE TRANSFORMERS

LATROBE

FLOOR BOXES

WIRING SPECIALTIES

PRODUCTS

QUALITY THAT LASTS

The simple, compact design of "Latrobe" Floor Boxes and Wiring Specialties makes them so easy to install, so dependable in service. Made of the finest materials available, "Latrobe" Products offer true economy.

Sold Only Through Wholesalers

No. 110 "Latrobe" Watertight Box

The neat, unique design of the No. 110 Box allows it to be installed in record time. Its simplicity assures trouble-free performance. Cover Plate is 3½" diam. No. 208 Receptacle.

No. 252-R "Latrobe" Two Gang Box

Watertight and adjustable with No. 208 Receptacle in one section. Compact and efficient. One Cover Plate has ½" flush brass plug; other, 2".

No. 284 Nozzle with No. 200 Cover Plate

This Duplex Receptacle Nozzle is the most useful and efficient on the market. Is furnished with ½" or ¾" brass pipe extension, and easily installed.

No. 150 Box No. 207 Nozzle

The No. 150 is a soundly constructed Box with 4⅛" Cover Plate and large Adjusting Ring No. 215. Compact, economical, efficient.

No. 330 Tom Thumb Utility Outlet

A versatile outlet that is excellent for use in wood floors, mantels, baseboards and other installations free from moisture or mechanical injury. Installed quickly with no harm to finish.

No. 470 "Bull Dog" Pipe or Conduit Hanger

Sturdy and dependable for hanging pipe or conduit ½", ¾" and 1" to steel beams up to ⅝" thick. Larger sizes for larger pipe.

EASILY INSTALLED

FULLMAN MANUFACTURING CO. LATROBE, PA.

ECONOMICAL

TEN-GLOVE TEST UNIT with screen enclosures removed to show test compartment, glove rack, tank, control panel, and equipment for automatically timing test cycle.

to a minimum length to minimize corona. High-voltage relays, on each glove electrode circuit, are connected with a milliammeter to measure current flow through the gloves.

To make the test, the operator opens the access gate to the glove rack compartment; raises the rack into top position; clips each glove to two insulated "fingers"; pulls the levers to fill each glove with water (fill pipes extend down through tubular electrode into glove); then lowers rack so gloves are immersed in the water in the tank. The water in the gloves displaces water in the tank until, through a drain arrangement, the water level in the gloves and in the tank are the same. Both the water level and depth of the electrode in the gloves are controlled. A guage in the tank assures uniform level for each test.

After the glove rack has been lowered into the tank, the compartment gate is closed (lowered) and the locking lever turned to "closed" position. The tank is now ungrounded and all is ready for the test cycle. After the operator presses a button on the control panel, the test transformer voltage is automatically raised at the rate of 1,000 volts per second until the desired test voltage is reached. At this point, an electrical timer takes over and holds the test voltage on the gloves for a period of three minutes. Leakage current on each glove can be read on the milliammeter by pressing a button (one for each glove) on the control panel. At the end of the three-minute period, the test voltage is automatically disconnected from the gloves and the test circuit automatically resets itself for another cycle. The access gate is unlocked (which automatically grounds the tank) and raised and the tested gloves removed.

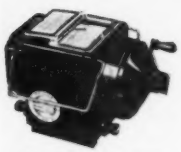
ADV.

BIDDLE *Instrument News*

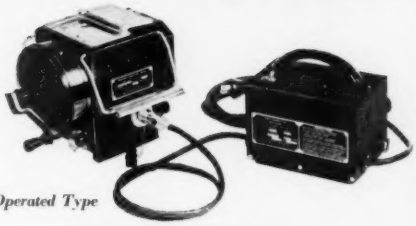
- ELECTRICAL TESTING INSTRUMENTS
- SPEED MEASURING INSTRUMENTS
- LABORATORY & SCIENTIFIC EQUIPMENT

NUMBER 10 OF A SERIES

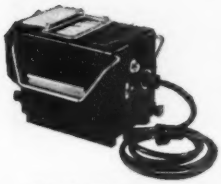
JAMES G. BIDDLE CO., 1316 ARCH ST., PHILADELPHIA 7, PA.



Hand-Operated Type



Dual-Operated Type



Rectifier-Operated Type

MEGGER® ELECTRICAL INSULATION TESTERS in Types to Suit Varying Needs For Shop and Field

There's a Megger instrument to suit any set of conditions in shop or field, or a combination of both. The types shown here were born out of the actual experiences and requirements of practical electrical engineers and maintenance men, who found in the James G. Biddle Co. a personal interest in their electrical insulation checking problems.

The Hand Crank Meg Type of Megger Insulation Tester is a reliable field instrument, light, sturdy, with constant-voltage type generator—no dependence on batteries or other current supply. Ranges to 2000 megohms, hand generators to 1000 volts d-c.

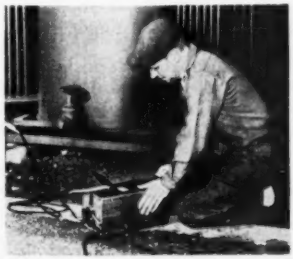
The Rectifier-Operated Meg Type of Megger Insulation Tester covers the same ranges as the hand crank model. It is most efficient for bench work—long tests or repetitive tests of a "production line" nature because it operates from a built-in rectifier that plugs into a convenient outlet.

The most versatile of the Megger family of instruments is the *Dual-Operated* Meg Type of Megger Insulation Tester. This can be a field instrument with hand crank, or instantly converted into a rectifier-operated instrument by handy plug-in rectifier connected to 115 v. 60 cycles outlet. Same ranges as other Meg Types.

For a complete picture of the Biddle line of Megger Instruments write for Bulletin 21-05-ECM.

IDEAL INSTRUMENT FOR GROUND RESISTANCE TESTS "OUT IN THE FIELD"

Meg Type of Megger® Ground Tester



A high-quality, rugged instrument that gives reliable ground resistance readings even in the hands of work crews and test men who are not experts in electrical instruments. It is direct-reading in ohms requiring no calculations. It has one set of connections for 3-terminal or 2-terminal tests, and an unfailing hand generator power source. Unaffected by stray current in the earth, or by polarization or electrolysis. The Meg Type of Megger Ground Tester is accurate to within 1/32 of an inch along its scale.

Available in 5 range scales from 0-300 to 0-3000 ohms. Furnished complete with test leads and reference ground rod. Dimensions of instrument are 5" x 9¼" x 6¼". Weighs about 8 lbs.

We shall gladly furnish to responsible prospects the names of companies who have adopted these handy instruments for field crews. Write for list "ECM" . . . also Ground Tester Bulletin 25-ECM, and "Grounding Electric Circuits Effectively" by J. R. Eaton (Bulletin 25T2-ECM).

ON GETTING FLOOD-SOAKED ELECTRICAL EQUIPMENT BACK INTO SERVICE

During July the nation's interest shifted from the tides of war to the floods in Kansas and Missouri. The threat of this major catastrophe to the nation's emergency production program assumed staggering proportions. For most of us this whim of Nature was only a newspaper or newsreel story which didn't affect us directly at all. But for those in the path of this destructive inundation it meant untold hardship and property damage.

The task of restoring order and setting the wheels of industry in motion is a story in itself. The electrical men, and readers of Biddle Instrument News can well appreciate what would happen in their own plants if all motors, generators, transformers, and starting and control equipment became covered with water and dirt for days and weeks on end. The clean-up and dry-out job would be terrific.

The electrical supply houses and electrical maintenance and repair shops assisted tremendously in helping to restore order out of chaos. The Westinghouse Corporation for example used full pages in the Kansas City Star to bring their "Guide to Flood-Time Care of Electrical Equipment" to Industrial Management. In our own case, we had Megger Insulation Testing Instruments on their way two and three hours after the emergency calls were received.

Floods Not the Only Enemies of Electrical Equipment

The proper care of electrical equipment, or electrical preventive maintenance, is a year round job. Dirt and moisture in any form must be combated month in and month out. Dependable instruments for testing insulation at regular intervals are a must if the records of the condition of electrical equipment are to mean anything.

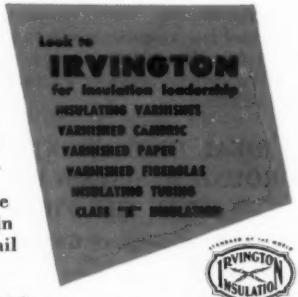
Among electrical men in industry the Megger Insulation Tester ranks high. Most men think of the Megger Instruments when they think of electrical insulation resistance testing.

NOTE: ***Readers of Biddle Instrument News can obtain information on "Tests When Drying Out Wet Apparatus" from our Megger Instruction Manual 21-J-ECM. If you do not have a copy write to us for one.***

For motor repairs that end *re-repairs*
I. R. Nelson counts on HARVEL 612-C Varnish

When a motor repair job *must* stand up under the toughest operating conditions, leaders in every branch of industry turn to I. R. Nelson Company of Newark. For years, Nelson has been known for motor repairs "when it's too important to gamble."

Naturally, Nelson won't gamble on the quality of the repair *materials* it uses! Its consistent choice for insulating varnishes is Harvel 612-C—because this varnish has proved, over and over, on Nelson's most exacting repair jobs, that it withstands severest service. Prolonged high temperatures do not affect its dielectric strength or flexibility. It offers outstanding resistance to acids, alkalies and oils. *And* Harvel 612-C—like other Irvington internal curing varnishes—saves time and money on quality repair jobs in shops all over the country . . . it bakes quickly and easily to a tough, strong coating.



For most effective results with Irvington Varnishes, get our free Varnish Selector Chart. It gives full technical data to assist you in *selecting* the right varnish—and *using* it to best advantage. Mail coupon for your chart and detailed information on Harvel 612-C.

WISE MOTOR USERS PATRONIZE QUALITY REPAIR SHOPS

Send this convenient coupon now

Irvington

VARNISH & INSULATOR COMPANY

Irvington 11, New Jersey

Plants: El Monte, California Hamilton, Ontario, Canada

EC-9-51

Irvington Varnish & Insulator Company
6F Argyle Terrace, Irvington 11, N. J.
Gentlemen:
Please send me your Varnish Selector Chart and literature on Harvel 612-C.

Name.....Title.....

Company.....

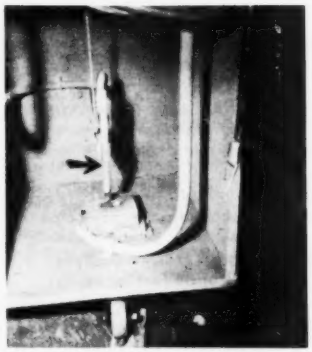
Address.....

City.....Zone.....State.....

Motor Shops

PORTABLE TEST CABINET can be rolled up to welder in the shop or in the field and quickly connected.

OPERATOR LOADS WELDER by raising or lowering handle which varies the gap between carbon rod and steel block electrodes in cabinet. He watches meters to note current and voltage values.



INSIDE CABINET arc is struck between adjustable carbon rod (arrow) and stationary steel block. Carbon arc replaces former resistance grid method of loading welder under test.

Test Unit For Portable Welders

Like all progressive organizations, the Clarence W. Silver Company in Salt Lake City, Utah, is always adapting ideas which will increase its operating efficiency and do a better job for its customers. Today, with the need for increased productive capacity in the face of possible skilled manpower shortages, such a philosophy is doubly important.

One effective time-saver in the motor repair department is a portable test set designed to increase the speed and accuracy of tests on portable electric welders. Formerly, banks of resistors and portable instruments were used. Now all test equipment is housed in a compact, portable enclosure which can be used in the shop or transported by truck for field use.

The base of the unit is a sheet steel cabinet (on angle-iron frame) which encloses a carbon arc assembly used to load the welder under test. The carbon rod is held in a clamp attached, through a linkage, to an operating lever protruding through the front of the cabinet. As this lever is moved up or down, the carbon rod is raised or lowered in a vertical plane.

An electric arc is struck between the carbon rod and a heavy steel block fastened to the base of the cabinet. The steel block makes it easier to strike an arc than with two carbon rods which might prove difficult to keep in perfect alignment. It also reduces maintenance and operating costs since the steel lasts much longer than the carbon rods.

Test loads applied to the welder are varied by increasing or decreasing the length of arc (gap) between the rod and block. As the operator loads the welder, he watches two groups of instruments mounted on a recessed panel on top of the cabinet. The top row contains a direct current voltmeter and ammeter to indicate exciter field current (0-15) and voltage (0-300). Two similar meters in the bottom row indicate welder generator output current (0-800) and voltage (0-150).

The unit, built in the Silver shop, cuts welder test time to about 10 or 15 minutes; is simple to operate; helps the organization do a better job as an Authorized Lincoln Electric Welder Service Shop.

Polarity Tester For Small Stators

Testing polarity on small motor stators is no chore at the F & H Electric Motor Company in Dallas, Texas. To simplify this operation, co-partner T. A. Heermans designed a handy little gadget that indicates polarity and can be used to add an identifying mark at the same time.

The unit consists of a 6-inch long brass handle with an offset yoke on one end to hold a compass needle. A set screw in each finger of the 1½ inch wide yoke holds bearing pins for a compass needle which is free to rotate 360 degrees. The north pole of the compass needle is painted red for easy identification when the instrument is lowered inside a stator. Mounted to the bottom of the compass yoke is a metal tube to hold either marking chalk or a stick of soapstone.

When using the instrument, the mechanic lowers it inside the stator and watches the needle as he moves it around. A south pole will attract the red (N) side of the needle or repel the unpainted (S) side. A north pole will repel the red (N) side of the needle and attract the unpainted (S)

"EVERY PROGRESSIVE REWIND SHOP SHOULD CAPITALIZE ON *Dow Corning Silicones*"

Mr. Frank Sweeney, *Superintendent*,
ALFRED L. BROWN ASSOCIATES, INC.
Worcester, Massachusetts

SERVICE is the buy-word in rebuilding motors. And service is more than courtesy, prompt handling and expert craftsmanship. In many cases, satisfactory service depends upon your ability to make standard equipment stand-up under highly specialized conditions.

That's where Class H insulation made with Dow Corning Silicones comes to the rescue. It's a plus value that distinguishes a progressive and growing shop from the conventional and static operation. It can save many thousands of dollars for your customers and it brings you more profit and prestige.

Start with this fact. Dow Corning Silicone Class H insulation is no more difficult to handle than Class B insulation, and it carries a much better profit margin. It earns that extra profit many times over by making hard-working motors last 10 times longer than they ever did before. That's why more and more maintenance, production and top management men are asking for Class H insulation.

Proof lies in the fact that many plants now specify Class H exclusively for pump motors, fan and blower motors, crane hoist motors, motors in reversing service, powerhouse auxiliary motors — critical motors of all kinds. Production men have also found that they can save thousands of dollars by using Class H to up-rate motors by as much as 50%.

And here's another fact to remember. Experience shows that the motor repair shop that places the first Class H job in any industrial center starts a potent word-of-mouth advertising campaign. And that's the best kind of advertising money can buy; the most certain way to win new customers and to increase your total volume of business. That's what we mean when we say:

Dow Corning Silicones Build Rewind Business!

Write Today

For more information, technical or sales assistance, call our nearest branch office or write to Dept. G-9.

DOW CORNING CORPORATION
MIDLAND, MICHIGAN

ATLANTA • CHICAGO • CLEVELAND • DALLAS
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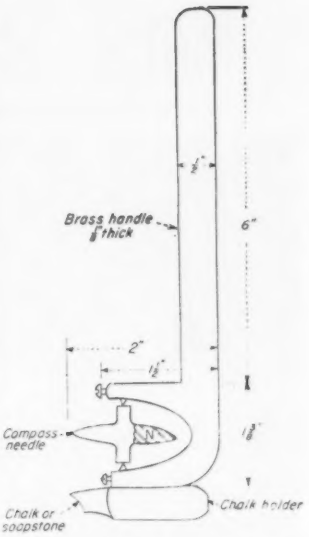
DOW CORNING SILICONES



POLARITY TESTER is made of brass with dimensions as indicated; holds compass needle which rotates on spindle bearing pins in yoke fingers; has marking chalk holder on bottom.

side. The mechanic can use the same instrument with its chalk marker to identify the pole positions.

F & H personnel find this gadget especially helpful when working on small diameter stators and on three-phase units where pole positions are difficult to determine. The unit has also been used to check stator connections.

Rolling Test Panel For Work Bench

An overhead rolling testing panel is of considerable use in the shop of

MOVABLE TEST PANEL can be rolled to any position along the work bench. Standard 2-lamp flourescent fixtures provide adequate lighting.

TESTING TIPS

for the maintenance of plant equipment

Portable Testing Instruments Ideal for Precise Measurements

General Electric's Type AP-9 (for a-c) and DP-9 (for d-c) portable testing instruments are used for production testing, maintenance work, and trouble investigations where precise measurements are required.

Their accuracy of ¾ of 1% for a-c and ½ of 1% for d-c also makes these instruments well suited for use in industrial and educational laboratories.

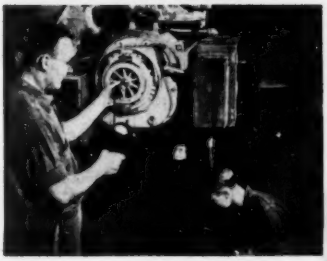
Small in size—2½ by 6½ by ¾ inches—Type AP-9 and DP-9 portables are easy to carry and easy to store. Their strong Textolite* cases have snapdown covers that protect the scale and binding posts. The distinct scale markings, mirror scale, and knife-edge pointer help an operator to eliminate reading errors.

These instruments can also be supplied with a pointer stop to make instantaneous readings easier. AP-9 and DP-9 instruments with the pointer-stop feature are particularly adapted for measuring welding current, motor-starting current, and voltage dip.

*Reg. trademark of General Electric Co.

YALE & TOWNE CUTS TESTING TIME 10% WITH EASY-TO-USE G-E HAND TACHOMETER

Both Linear and Rotating Speeds Measured With Same Instrument



"Besides cutting our testing by 10%, the new G-E hand tachometer has proved to be the only speed-measuring instrument which we have that will give an accurate and instantaneous reading," reports Yale & Towne Manufacturing Co., Philadelphia, Pa. Yale & Towne, manufacturers of materials-handling equipment, finds it necessary to make extensive tests on its hoist motors before shipment.

By using the G-E hand tachometer this company is able to take rapid readings of each hoist at various loads and operating speeds. During testing, it is necessary to take instantaneous readings of the hoist's speed during the raising or lowering of loads.

UNIQUE REACTANCE PRINCIPLE

Employing a unique electrical-reactance principle, the G-E tachometer consists of two units; the head and the indicating unit. The two are joined together by means of a two-foot flexible electric cable. Power for the tachometer is obtained from a single standard battery located in the indicator handle.

A simple adjustment of the "check-battery" knob on the front of the instrument compensates for any possible change in voltage. The G-E hand tachometer has sustained accuracy of 1% of full scale.

Measuring ranges for rotational speeds are from 200–10,000 rpm in three ranges, and linear speeds from 20–10,000 fpm in six ranges. High- and low-speed adapters are available to further extend the speed-measuring ranges. Both a 1 ft and a 1/10 ft circumference disc and roller are also supplied.

ALLEGHENY LUDLUM PLANT ENGINEER REPORTS...

"Our AK-3 hook-on power factor meter enables us to quickly and easily obtain power factor readings in our outdoor switching station with the minimum amount of trouble," says R.M. Brooks, Allegheny Ludlum Plant Engineer.

Allegheny Ludlum Steel Corp. is now increasing the capacity of its present operation at Watervliet and has found the AK-3 to be of great value in checking power factor in new feeder banks in its outdoor switching station.

Designed to help you lower power bills, improve voltage regulation, and reduce needless heating of power cables, the AK-3 may be used on any balanced three-phase circuit. It reads power factor directly in circuits with voltages from 100 to 600 volts and currents from 15 to 600 amperes. The AK-3 weighs only 4½ pounds, and will handle conductors up to 2 inches in diameter. Readings are obtained by merely clipping in the voltage leads, hooking around the line and reading PF directly on the scale.

GENERAL ELECTRIC

SECTION A 602-215, GENERAL ELECTRIC
SCHENECTADY 5, N. Y.

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☐ Type AK-3 Power-factor Meter GEC-775
☐ Hand Tachometer (GEC-241)
☐ AP-DP-9 Portables (GEC-830)

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COMPANY .....

STREET .....

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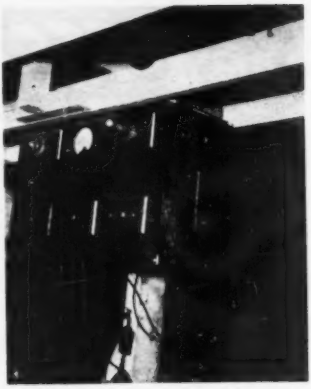


ROLLERS are mounted above the test-kit, while wooden rails run length of bench.

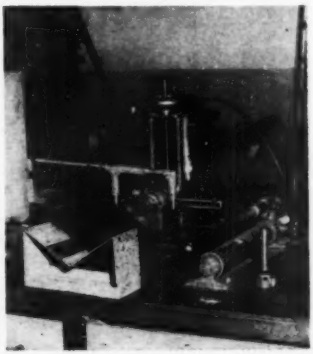
Knoxville's Tennessee Electric Motor Service, for it can be easily moved along the length of the work bench and serves numerous bench positions without requiring long cable leads or multiple receptacles.

The testing panel is fitted with axles and rollers, mounted above the meter cabinet, and the rollers consist of hardwood members. When the testing equipment is desired, it is an easy matter to push or pull it into position and, when it is not in use, it can be left with the leads looped over hooks provided for that purpose.

Adequate lighting is provided along the entire length of the work bench by 2-lamp industrial fluorescent fixtures.

Table Top Ram Is Useful Tool

A small hydraulic ram, easily operated by a hand lever, is a useful bench tool in the shop of the Central Electric



HYDRAULIC RAM, adjustable for height and with a yoke to keep arms from spreading under pressure, is a serviceable bench tool.

IF IT'S PARANITE IT'S the RIGHT Wire and Cable

PARAFLEX Non-Metallic Sheathed Cable lays flat. Won't squirm or twist. Clean to handle. Plainly marked.

PARASYN Type TW Thermoplastic Wire stands exposure too severe for rubber insulated wires. Smaller diameter.

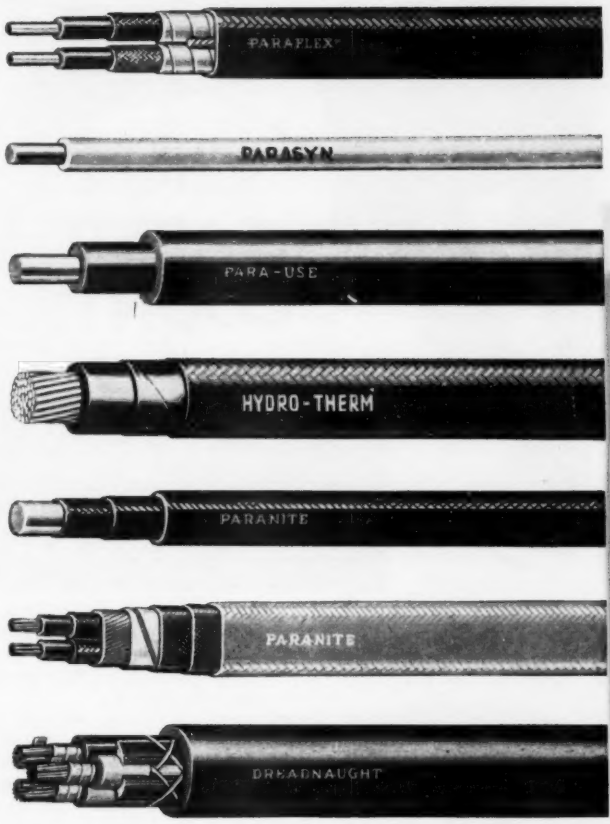
PARA-USE Type "RR" Cable provides permanent underground installation from power line to meter and for connecting several buildings.

HYDRO-THERM Building Wire combines in a single wire the heat-resistant qualities of Type RH and the moisture resistant qualities of Type RW.

URC Weatherproof Wire and Cable can be relied upon to meet severe climatic conditions. Both actual line and Weather-Ometer tests prove unusual ageing characteristics.

SERVICE ENTRANCE CABLE, Type SE Style U unarmoured and Type SE Style A armoured. There is also a Paranite Service Drop Cable, two conductor, Type SD.

DREADNAUGHT Heavy Duty Cable has lead-cured neoprene insulation. Flexible, durable, safe, long-lived. Cuts repairs and replacements. Delivers current continuously.



IF IT'S **PARANITE** IT'S RIGHT!

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5233 Klein-Kord Safety Strap

5249 Klein-Line Tool Belt

1901-M Climber

1628-3BH Klein Chicago Grip

When it comes to equipment on which life depends—safety straps and belts, climbers and grips, pliers and tools—there can be no compromise with quality.

Nearly a century of experience is back of Klein equipment for linemen and electricians. Today the name Klein is recognized for highest quality wherever such equipment is used. When life is at stake, only *the best* is *good enough.* In tools and equipment, this best is Kleins—"since 1857."

ASK YOUR SUPPLIER

Foreign Distributor: International Standard Electric Corp., New York

If you have not received your copy of the Klein Pocket Tool Guide, write for one. It will be sent to you without obligation.

Since 1857

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
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Company, Cambridge, Massachusetts. Used for pressing shafts into or out of small rotors, the ram can be raised or lowered by means of an arbor and worm-wheel arrangement, making it possible to readily adjust the height of the ram to the exact height of the shaft in the cradle-held rotor.

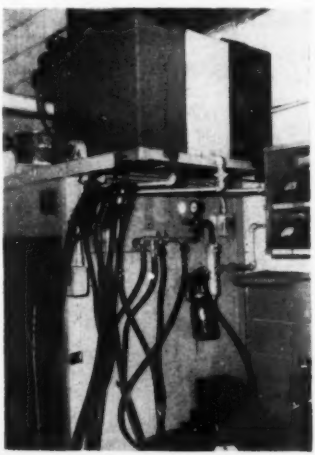
To prevent the steel stator-holding arms from spreading under pressure, a yoke, adjustable for span, bridges these two members. In operation, it is fast and simple to place the stator in the cradle, crank the ram into position, adjust the length and parallel distance of the two arms, and pump the hydraulic lever.

Paint Reservoirs Are Color Coded

Above the paint spray booth of the Central Electric Company in Cambridge, Massachusetts, are three metal reservoirs painted, respectively dark grey, light grey and black, indicating the color of paint contained in the three vats. Pipe and hose connections carry paint to spray guns, painted to correspond with the connected tank, so that rapid identification is possible when a worker desires to spray a repaired motor.

Float indicators show the level of the paint in the various reservoirs, while agitators—activated by time clocks—keep the paint from thickening and clogging the nozzles.

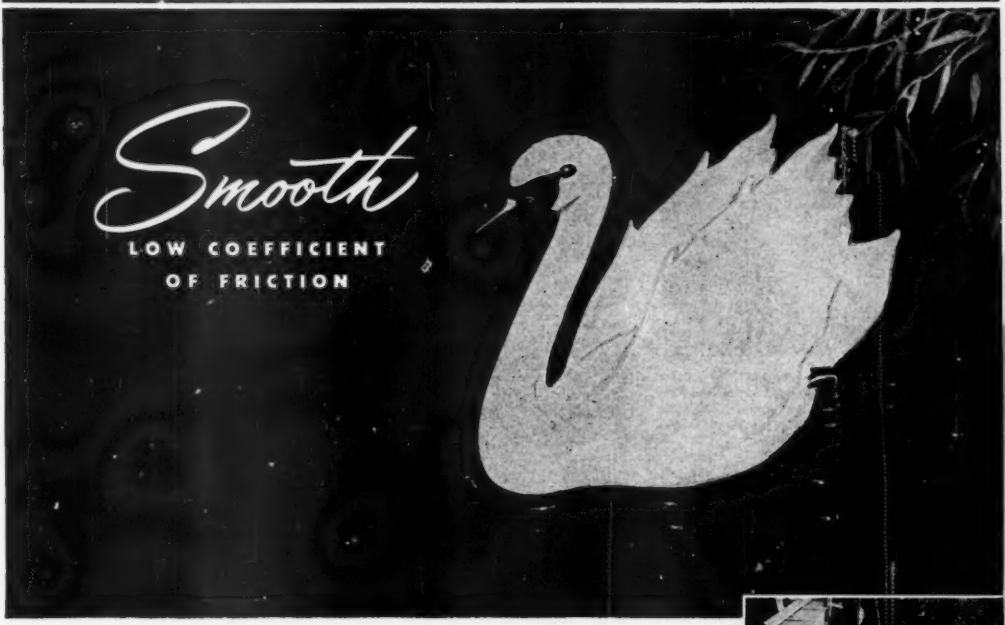
Compressed air feeds into the paint gun nozzles through duplicate hose connections, atomizing the paint into a fine, penetrating spray.



TANKS, PIPES AND GUNS are painted the same color as the paint contained in the various systems, insuring the use of the color desired when spraying motors.

ORANGEBURG *Fibre* CONDUIT

STANDARD *installed with Concrete* · **NOCRETE** *installed without Concrete*



Orangeburg's *smooth bore* protects cable sheath from abrasion when pulled in . . . and Orangeburg's low coefficient of friction keeps pulling tensions on cable to minimum.

Orangeburg's impermeable wall and tight joints safeguard the cables from infiltration of ground waters and other corrosive elements throughout their long life underground.

AND THE CONTRACTOR FINDS ORANGEBURG INSTALLATIONS CONSISTENTLY PROFITABLE

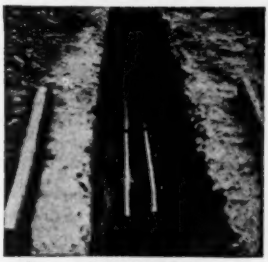
Orangeburg lays fastest and at lowest cost of any conduit . . . because of its light weight, long lengths and ready workability in the field.

STANDARD—For three or more ducts . . . use ORANGEBURG STANDARD *with* concrete encasement.

NOCRETE—For one or two ducts . . . ORANGEBURG NOCRETE . . . installed *without* concrete encasement . . . proves profitable when conditions favor its use.

The Orangeburg trademark identifies *all* Orangeburg Conduit. SEND FOR *Free* Illustrated Folder. Write to Dept. EC-5, Orangeburg Manufacturing Co., Inc., Orangeburg, N. Y.

STANDARD



NOCRETE

Graybar ELECTRIC COMPANY

DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT

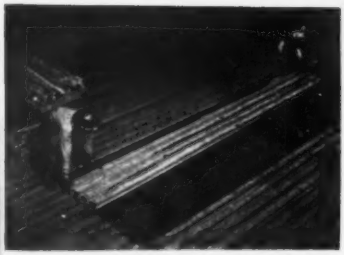
GENERAL ELECTRIC SUPPLY CORPORATION

Branches and Stocks in Principal Cities

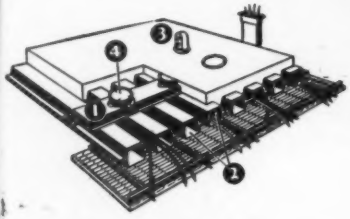
Prepared for Unforeseen Electrical Expansion

WITH

G-E Q-FLOOR WIRING



Q-Floors are installed easily and quickly. They become working platforms. With G-E Q-Floor wiring, the floor is the raceway system. Each floor cell is a complete raceway, ready for wiring, ready for electrical changes any time during the life of the building.



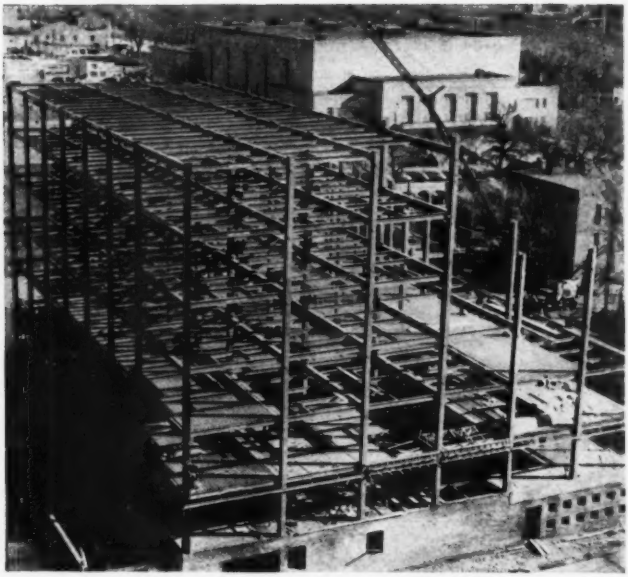
G-E Q-Floor Wiring System Means Electrical Flexibility—

1. Header duct—at right angles to Q-Floor—carries wire from load center to cells.

2. Cells serve as raceways for power, signal, and telephone systems.

3. Floor outlets are installed by drilling Q-Floor cells at any point.

4. Junction units in header duct permit easy access to wiring at any time.



SOUTHWESTERN BELL TELEPHONE COMPANY BUILDING, TOPEKA, KANSAS

Architect—Stookey and Howells, Topeka; *General Contractor*—M. W. Watson, Topeka; *Electrical Contractor*—Shrake Electric Co., Topeka; *Owner*—John R. Peach, Topeka

The farsighted designers of this building leased by the Southwestern Bell Telephone Company have specified General Electric Q-Floor wiring for complete electrical flexibility—now and in the future.

Predicting future requirements of an electrical system is difficult, yet today's power, telephone and signal circuits must be adaptable to tomorrow's layout changes. For adaptability make this provision for changes in the blueprint stage. Plan to meet *all* unforeseen electrical expansion with G-E Q-Floor wiring.

This built-in raceway system provides for the placement of new or relocated power and communications outlets within six inches of any point on the floor—at any time during the life of the building. To add a new outlet, simply drill a hole through the top of the raceway cell . . . wire the outlet . . . and set it into place. Outlets can be removed just as easily when they are no longer needed. And, the job can be done so quickly, normal operations continue undisturbed.

Check the versatility of G-E Q-Floor wiring, yourself. See how it keeps commercial, industrial, and institutional buildings electrically young. For complete information and a free copy of the Q-Floor Wiring Data Manual call your nearest G-E district office. Or, write Section C61-918, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL ELECTRIC

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Electrical Construction and Maintenance is written for you by a large staff of editors and consultants, each an authority on some phase of the business. They will be glad to give you expert advice and answers to your questions.

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See other side of this page.

Product News

Lighting Equipment (1)

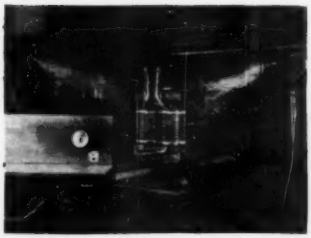
An improved line of protective lighting equipment includes the Spherolite and Fresnelite luminaires. Spherolite provides IES light patterns, Type I through Type V, and is designed for incandescent lamps up to 575 watts on multiple circuits or 10,000 lumens on series circuits. It will accommodate 11,000, 15,000 or 20,000 lumen vertical position mercury vapor lamps. Fresnelite was designed for glare lighting of outer fence areas. Complete control equipment is available for all protective lighting Installations.

Line Material Company, Milwaukee 1, Wis.

Starters (2)

New ac combination magnetic starters, non-reversing with fused or unfused disconnect switch, have been designed for use with squirrel-cage and wound-rotor induction motors, 25-60 cycles. These starters eliminate wiring and mounting separate disconnect switches and starters, and are equipped with a 3-pole manual disconnect switch; a magnetic across-the-line starter; thermal overload relays; and pilot-circuit holding contacts for use with start-stop pushbutton controls. The disconnect switch will disconnect the motor and control from the line for repairs or shut-downs. Fused disconnects provide short-circuit protection to wiring. The thermal overload relays in the magnetic starter element provide inverse time limit overload protection.

The Euclid Electric and Mfg. Co., Madison, Ohio.



Transformers (3)

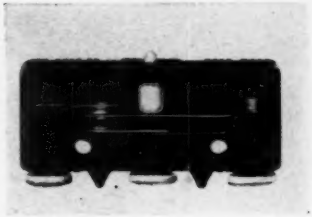
New dry type transformers with Class H insulation have been developed for station auxiliary, unit substation, and network service. These transformers, available as either ventilated or sealed-in-nitrogen units, are rated at 3000 kva, ventilated, and 2000 kva, sealed-in-nitrogen, with voltages up to 15 kv. They are fire-resistant, explosion-resistant, moisture-repellent and heat stable.

Pennsylvania Transformer Company, P. O. Box 330, Canonsburg, Pa.

Vibration Isolators (4)

New unit vibration isolators have been developed which cover load ranges of 8 to 16 lbs., 14 to 25 lbs., and 22 to 35 lbs. Two series of these units may be attached directly to the equipment instead of requiring dimples at the mounting holes. Other types in this new line are made to withstand severe shocks such as those met in arrested landings in aircraft carrier service and in crash landings. All isolators in this line are tested for high shock resistance and are unaffected by very extreme temperatures.

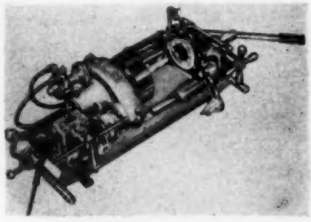
The Barry Corp., 833 Pleasant St., Watertown 72, Mass.



Limit Switch (5)

For applications requiring a compact, light-weight, long-life, limit switch, the du.op switch has been developed. As a direct acting switch, the du.op has no inherent characteristics of bounce, and mechanical lost motion is eliminated by instantaneous contact, made at the same fixed point of repetitive plunger travel. Other features include; even transfer of contact silver, constant contact pressure, lower electrical resistance and less heat. The contact arrangement is single pole, double throw, spring return, and will handle up to 20 amperes, 125-volts ac, non-inductive.

General Controls Company, Boston 34, Mass.



Pipe Machine (6)

The Model E lightweight pipe threading machine is now equipped with a safety switch lock. The power units C1 and C2 are also protected with safety switch locks. The lock is an important device protecting workmen as well as machine against possible injury. It makes it impossible to start the Model E unless chuck wrench has been removed from the chuck and placed in its holder. This feature replaces the old-style wrench ejector that ejected only special types of wrenches. Now, no special wrench is required.

Beaver Pipe Tools, Inc., Warren, Ohio.

Cat. No. 450 SET SCREW CONNECTOR FOR THIN WALL CONDUIT

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MODERN FITTINGS FOR

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- flexible steel conduit
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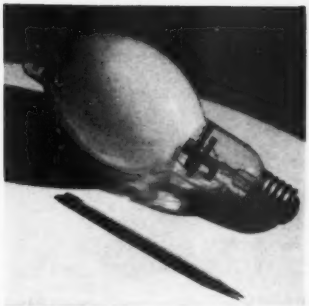


Industrial Lamp (7)

Designed to provide a whiter light from a mercury-vapor source, the new 400-watt I-H1 fluorescent mercury-vapor lamp is available for industrial use, floodlighting and street lighting. The bulb of the J-H1 has an inside coat of a phosphor that fluoresces red when activated by invisible ultraviolet light generated by the quartz arc. This tends to balance the spectrum to provide a light that is white enough for most industrial purposes. Lamp will burn in any position and can be used in existing fixtures for 400-watt mercury lamps. Lower brightness of the lamp makes operation at lower mounting heights practical. The J-H1 will operate from H-1 ballasts.

Westinghouse Electric Corp., Lamp Division, Bloomfield, N. J.

Ventilator (8)

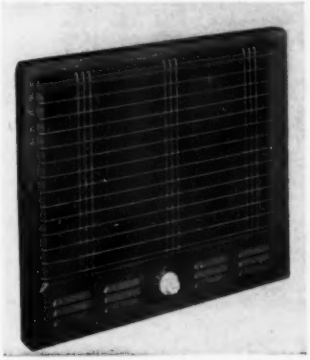
Aerofan Model 225 ceiling ventilator has been designed for easy installation in the ceiling or in restricted soffit conditions, and may be discharged either vertically through the roof, horizontally through the soffit or between the ceiling joists to the nearest outside wall. The housing frames in with two 2 by 4's between the ceiling joists, and the plaster flange is reversible and can be fastened above or below the plaster. The knock-out box is removable from the inside of the housing, so that the hole in the ceiling can be held to a minimum on remodeling jobs.

Pryne & Co., Inc., 140 *N. Towne Ave., Pomona, Calif.*

Relay (9)

A new time delay relay utilizing a hydraulic-magnetic operating principle has been developed. This relay has only one moving part in the time element which is hermetically sealed and needs no attention. It has a rated capacity of 10 amperes at 120 volts ac. The relay operates on the increased magnetic flux caused by a movable iron core which is drawn into the magnetic field by the energized relay coil. A silicone liquid, in which the core moves, provides the time delay by slowing down the core movement. Relays are available with timings up to 4 minutes.

Heinemann Electric Co., 381 *Plum St., Trenton* 2, *N. J.*



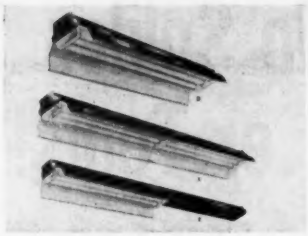
Heating Panels (10)

Radiant heating panels which use a Pyrex glass heating element are now available. These surface wall mounted units use either a wall type thermostat or a built-in thermostat, and are sturdily constructed. There is no glowing element and no maintenance. Bus bars with multiple silver clad spring contacts provide contact to the terminating edges of the solid coated glass element, and the starting load is the same as the running load. Ratings of the units are: 1000 watts, 110, 208 and 220 volts; 600 watts, 110, 220 volts. The panels are available in several models.

Berko Electric Mfg. Corp., 179-05 *Jamaica Ave., Jamaica* 3, *N. Y.*

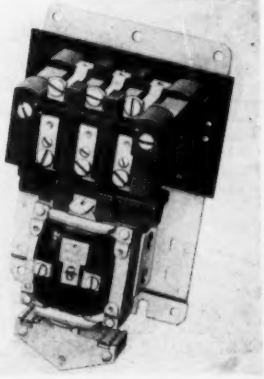
Fluorescent Fixtures (11)

Eighty-two fluorescent fixtures are available in the new "Dynalite" job-rated industrial line. Especially suited for industrial plants and shops are the two and four lamp, 40 watt medium bi-pin units. These units are equipped



with a choice of instant or conventional starters, and come in four foot, eight foot tandem and eight foot combination lengths (for economical "machine spaced" installations). All fixtures have 13 inch wide reflectors, which are available in either baked enamel or RLM porcelain. They use standard T-12 40-watt lamps. The units are completely wired and ready for line lead connections. They operate from 110-125 volts, 60 cycle alternating current.

Mitchell Manufacturing Co., 2525 *N. Clybourn, Chicago* 14, *Ill.*



Contactor (12)

Development of a new Size O ac solenoid contactor, Bulletin 4458, has been announced. This compact multi-pole contactor with double break silver contacts is designed for both load and control circuit use in controllers for machine tools, refrigeration and air conditioning equipment and similar control applications. Available in 3 and 5 pole form, this contactor can be furnished with ac or dc power plants. The contacts can be changed to form N. O. or N. C. poles. Maximum hp ratings are 2 hp, 440-550 volts, 3-phase, 60 cycle. Standard coils are available for 110-, 220-, 440- and 550-volt operation on 25, 50 or 60 cycle.

Ward Leonard Electric Co., Mount Vernon, N. Y.

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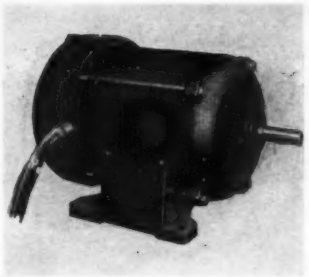
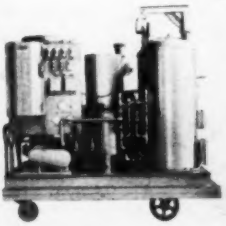


Motors (13)

Totally enclosed fan-cooled models have been added to the line of single-phase capacitor motors. This new design includes starting capacitors and switch mounted within the frame to provide maximum protection with minimum space requirements. Available in ratings of 1, 1½, 2, 3, and 5 hp, these motors can be used where dirt, grit, or moisture are encountered. Explosion-proof and dust-explosion-proof models are also available in this line. The 5 hp size operates on 230 volts only; the other sizes, on 115/230 volt, 60 cycles.

General Electric Company, Schenectady 5, N. Y.



Oil Purifier (14)

Development has been announced of the new Houdaille Purivac, a complete mobile unit for purifying insulating oil used in transformers and circuit breakers. Power interruptions and costly breakdowns caused by contaminated insulating oils can be eliminated with the Purivac, which removes all acidity, moisture and sludge, and restores interfacial tension and dielectric strength of oil, all in one operation. Purification, dehydration and degasification of insulating oil can be performed either in the field or at a central station. The compact, fully automatic unit is mounted on a sturdy steel base for ready adaptation to transportation and handling.

Honan-Crane Corp., 46 Madison Ave., Lebanon, Indiana.

Conductor (15)

Self-supporting Triplex conductor, in which three wires are loosely stranded into a single cable, has been developed for service drop and secondary line applications. This conductor consists of two neoprene or polyethylene - covered weatherproof wires stranded about a neutral messenger. The available sizes are 2, 4 and 6, AWG, with all-aluminum, ACSR or reduced size ACSR messenger. Free stripping, high abrasion resistance and absence of festoons are provided by the neoprene and polyethylene coverings; and the conductor is light in weight.

Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, Calif.

Door Operator (16)

A new door operator, Model CA-300, offers a number of new and exclusive features. Sectional-overhead-type doors can be opened, stopped at any desired point, or closed and locked. Ten different 12-volt remote controls are available to provide safe and dependable operation 24 hours a day in all kinds of weather. Unit is adaptable to any commercial or industrial doors. Motor and other equipment in the assembly are standard and easily replaceable. Operator is available in four lengths, depending upon the size of the door.

Robot Appliances, Inc., 13165 Prospect Ave., Dearborn, Mich.

Electric Tool (17)

Size 34U, new heavy duty universal electric Impactool has been designed for tough nut running jobs. It has a 1 inch square driver and is rated for bolts up to 1¼ inch size. The unit employs a heavy duty universal electric motor and an Impact unit, which permits handling truck U-bolt nuts without jacking up the truck. The impact mechanism converts the power of the electric motor to hundreds of rotary impacts whenever sufficient resistance to turning is met. These rotary impacts quickly run nuts up tight, or remove the most stubborn or frozen nuts. Unit weighs 32½ lbs.

Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y.

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DOUBLE PROTECTION Voltage Tester

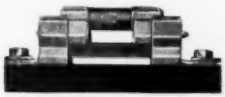
Takes the danger, lost time and guesswork out of many kinds of testing. Not just a "glo" type. Solenoid indicator shows nominal line voltages on a calibrated scale. Neon test lamp operates independently — either will work if the other fails. Strong, dust-tight case protects working parts. Test prods are heavily insulated, with safety collar and 4-inch handles. Reliable and easy to use. Fits and *belongs* in every electrician's pocket!

FUSE CLIP CLAMPS

Save Up to 6% on Current Use!

Reduce resistance between clips and fuses or switch blades. IDEAL Clip Clamps eliminate power loss—arcing, burning or heating of wires and cables—conserve fuses and clips. Real maintenance reducers that pay for themselves and last a lifetime! Seven sizes, knife or ferrule type.

FUSE REDUCERS



No need to change switch, panel or switchboard. Should be used whenever new circuits are built with plans for future increase in power load; install larger fuses later. Snap into clip like ordinary fuse. Standard sizes for N.E.C. cartridge fuses. Knife or ferrule type.

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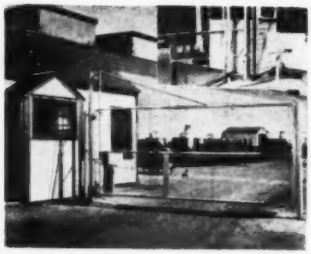
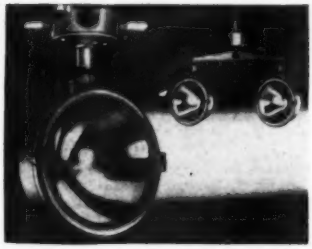


Gate Operator (18)

An automaitc all-weather protective gate operator has been designed to provide security and/or privacy for commercial and industrial plants, estates, farms and institutions. Called the Electric Doorman Swinging Gate Operator, the device powers double or single swinging and sliding gates. Standard time to open or close double swing gates, either in or out, is 5 to 8 seconds. Controls include; radio control, key post switch, electric eye, pull cord and ground trip. These gate operators are furnished with a safety clutch, thermal overload, heavy duty double wound motor and adjustable limit switch.

Electric Power Door Co., 2127 East Lake St., Minneapolis 7, Minn.



Spotlight (19)

This newly developed outdoor spotlight provides 100,000 candlepower with only a 300 watt rating. Unit is designed to concentrate its light output in a long-throw, oval-shaped, narrow floodlighting beam that is recommended for area protection lighting of railway sidings, switch and loading areas, shipyards, docks, air terminals and other industrial properties. Made of non-corrosive, heavy-duty cast aluminum throughout, unit has a universally adjustable cast-aluminum swivel arm threaded ½ inch NPT to fit a variety of standard interchangeable accessories such as flat base, weatherproof junction boxes, wall brackets, wiring troughs, etc. Unit is approved by Underwriters' Laboratories, Inc.

Stonco Electric Products Co., 489 Henry St., Elizabeth 4, N. J.

Control Cable (20)

A rugged, moisture-resistant, multiconductor control cable has been designed, utilizing an open-weave, Neoprene-treated Fiberglas cloth. Fiberglas cloth tape is wrapped around the conductors as they are stranded, and this permits free flow of the rubber between the conductors during extrusion of the jacket. Viewed in cross section, the cable shows uniformly spaced conductor wires firmly encased in a heavy Neoprene sheath. This cable has improved resistance to crush, deformation and moisture damage. The new control cable, available with any multiple conductor assembly, is well suited for mining, machine control and many other type cables.

General Electric Company, Bridgeport, Conn.

Fitting (21)

A No-Thread 90° short conduit elbow is now available for heavy wall conduit. This fitting is especially handy because its threadless design eliminates the need of turning the elbow to tighten. Designated as the 8-50NT Series, this new fitting is a big time saver when installing conduit on machines or in any location that requires short elbows and where space is at a premium. It is made of malleable iron to minimize breakage, and specially hot dip galvanized for long service life. Available in a range of sizes from ½ inch to 2 inches inclusive.

Gedney Electric Co., RKO Building, Radio City, New York 20, N. Y.

Alarm System (22)

Low cost, complete fire alarm systems have been announced. This line of alarm systems includes Underwriters approved thermostats. Systems are available for such applications as; protection of "sweating hay" in barns, protection of small yachts, and fire alarms for trailer trucks.

Blaze-Master Inc., 60 East 42nd St., New York, N. Y.

3 safety measures FOR HAZARDOUS LOCATIONS...

KILLARK Safety Lighting Fixtures

EXPLOSION-PROOF LIGHTS . . . A safe answer wherever inflammables or explosives are handled. Exclusive Killark ALUMALLOY construction combines strength, light weight, and compactness. Special heat-resisting glass has a safety factor of 4 to withstand internal explosions. Easy to relamp. Foolproof design. Sizes: 60W to 500W, in ceiling, bracket and pendant types.

VAPOR-TIGHT LIGHTS . . . Made in one-piece and assembled models. In either type the construction elements are absolutely vapor-tight and weather-proof. Reflectors – available in standard dome, shallow bowl or angle styles – are designed to meet any lighting need.

DUST-TIGHT LIGHTS . . . Graceful "ledge-free" design prevents dangerous accumulation of dust. Close-fitting lamp parts provide a positive barrier against dust particles. Furnished complete with lamp receptacle, inner polished reflector, and finished clear globe. Available in ceiling, bracket and pendant styles.

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P&S Pin Type Lampholders—ideal for temporary lighting work. Sharp pins pierce insulation and make firm, positive contact when cap is screwed down tightly. May be disconnected and used over and over again.

● P&S Wiring Devices are designed and manufactured to unusually high standards for dependability, performance and ease of wiring. They meet or exceed the minimum safety standards of existing testing agencies.

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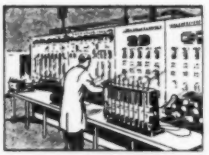

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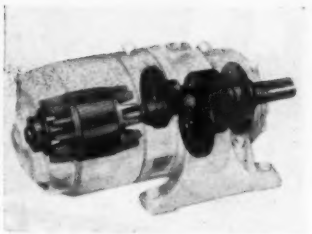
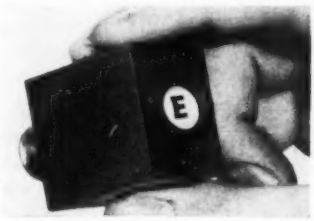


Gear Motor **(23)**

A new principle of geared power for electric motors has been developed to double the torque. By arrangement of duplex gears in place of a single gear train, the torque has been multiplied without increasing external dimensions. Speeds from 5 to 84 rpm can be obtained. The primary dual pinion is mounted on a splined shaft and is of herringbone design which permits equalization of the load to the duplex gears. Two secondary pinions are used to drive the output gear. Present models are built in sizes from 1 to 25 hp for double and triple reductions.

U. S. Electrical Motors, Inc., 200 *East Slauson Ave., Los Angeles* 54, *Calif.*



Indicator **(24)**

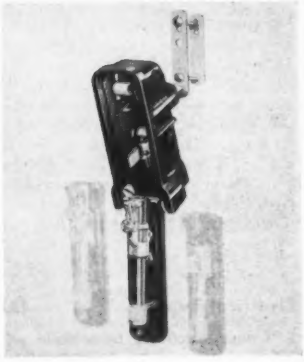
A remote-reading 3-position indicator has been developed for a variety of industrial applications. Patterned after the aircraft landing gear position indicator, the device consists of a rotating card which exhibits one of three printed symbols at a round observation window in one end of the instrument. Rotated by two solenoids, the card assumes a spring-balanced neutral position, exhibiting the third symbol, when neither coil is energized. The control solenoids can be actuated by any of a variety of float, pressure or contact switches in a simply devised wiring circuit. Unit can be adapted to indicating mechanical relationships, settings and positions not accessible for inspection. The card symbols can be designed to suit the device to such applications as; pressure indicator in hydraulic or air circuits, level indicator for liquids held in reservoirs, and an indicator in electrical systems.

Riverside Metal Co., Riverside, N. J.

Transformer **(25)**

A new, completely enclosed line of dry-type, air-cooled transformers has been designed for 3-phase, 60 cycle operation. Transformers are enclosed in a heavy gauge steel case constructed around a sturdy steel frame. Units are drip-proof and have circulation of air through screened bottom. Class B insulation affords protection for operation at a temperature rise of 80 degrees C. Sizes of 9, 15, and 30 kva are designed for wall mounting, indoor or outdoor use. Capacities from 45 to 225 kva are for platform mounting, indoor use only. Primary voltages of 600, 480 and 240 volts are available, with secondaries including 2 to 5% or 4 to 2½% taps.

Acme Electric Corp., Cuba, N. Y.



Fuse Cutouts **(26)**

A new line of 5,000 volt primary fuse cutouts has been designed for use on high fault current capacity distribution feeders. Available in continuous current ratings of 50, 100, and 200 amperes, these cutouts provide high interrupting capacities without the need or expense of high, continuous current rating. Heavy-duty cutout doors with fuse cartridges are available separately and are interchangeable with doors presently used on 50 and 100 ampere PVD cutouts.

Line Material Co., Milwaukee 1, Wis.

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BLEND
Light
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A COMPLETE LINE
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1 **NON-INTERLOCKING TYPES**
available in manually-operated and motor-driven models in capacities from 1,000 to 30,000 watts.

2 **PACKAGED UNITS**
compact facilities in one cabinet for dimming control. Offered in 6 - 1000 watt and 3, 4, 5, 6 - 2000 watt packages.

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for large switchboard installations. 2000 and 3000 watt assemblies can be mastered and grand mastered.

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a remote controller providing miniature selector station operation of non-interlocking motor-driven POWERSTAT dimmers.

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The ONLY Soldering Tool You Need for light or HEAVY Work!

Switch *instantly* from light to heavy work—or vice versa—with the 250-watt Weller Soldering Gun. *Controlled* dual heat makes the Weller Gun the only soldering tool you need for *all types* of work. 5-second heating saves time and current on every job, too. Your Weller Gun pays for itself in a few months!

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√ Check these exclusive features

- **TRIGGER-SWITCH CONTROL** Governs heat and saves power because no need to unplug gun between jobs. Heat goes off when you release trigger.
- **5-SECOND HEATING**—No waiting, no wasted current. Saves hours and dollars each month.
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- **WELLERTIP**—Rigid and chisel-shaped with more area for faster heat transfer. Over/under terminals brace tip, give greater visibility.
- **DUAL HEAT**—Single heat 200 watts; dual heat 200/250 watts; 120 volts; 60 cycles.

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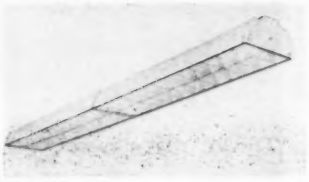


Lighting Units (27)

The new eight foot Challenger lighting units have been designed to provide lighting for industrial locations. These units, engineered to efficiently utilize four 40-watt, T-12, 48 inch fluorescent lamps (two rows of two lamps each), are constructed of heavy gauge steel, finished in durable baked white enamel. Wired for 110-125 volt ac circuits, they are complete with instant start or starter type ballasts.

Curtis Lighting, Inc., 6135 *West 65th St., Chicago* 38, *Ill.*

Runway Light (28)

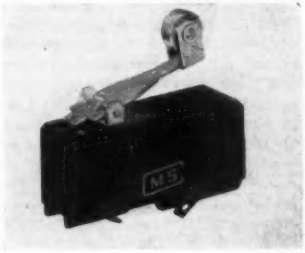
A bi-directional high intensity runway light has been designed to assure safer instrument landings of aircraft by providing clearer definition of airport runways during foggy or night operation. The light's 360°-glass lens also provides off-runway light for circling guidance. Available with clear, clear-yellow, or green lenses, the light uses a 200 watt, 6.6 ampere, T-14 bulb, prefocus base aviation lamp. Unit can be easily aligned and relamped.

Westinghouse Electric Corp., Box 2099, Pittsburgh 30, *Pa.*

TV Antennae (29)

Two new Antenaplex systems have been designed to meet the demand for master television antennae for small buildings. They are intended for use in multiple unit structures where a moderate number of television receivers, usually up to about 64, are to be operated from a single array of antennae. Model SX-7C is for use in installations requiring up to seven channels, and Model SX-4D, not more than four channels. In both systems, the amplifiers, power supply, and combining network are mounted on a single chassis. The systems have an input source impedance of 75-ohms, an output load impedance of the same value, and a frequency response within 4 db for a 4½ megacycle bandwith.

Radio Corporation of America, Camden, N. J.



Switches (30)

Rigid lever actuated high capacity basic switches are now offered in a new V series of Type A basic switches. The addition of rigid lever actuation provides a high capacity basic switch which requires a lower operating force than that of flexible leaf actuated switches. Listed by Underwriters' Laboratories for ¾ hp, 115 volts ac; 1½ hp, 230 volts ac; 20 amperes, 125, 250 or 460 volts ac; 10 amperes, 125 volts, L (L suitable for controlling tungsten filament lamp loads on ac circuits). This V series of switches has a .020 inch contact break distance, and contact arrangement is single pole double throw.

Micro Switch, Freeport, Ill.

Electrical Tape (31)

A new electrical tape made with Koroseal material has been developed. This new adhesive is non-transferring and can be pressed onto a dry surface innumerable times without losing its stickiness. It will not transfer the adhesive from the face, lose its tackiness or ability to adhere. This tape, which sticks securely to itself and copper wire insulation, has a dielectric strength of 8000 volts, is waterproof, flameproof, highly abrasion resistant, resistant to acids, oil, alkalies and corrosive salts. The tape is extra thin and can conform to irregular surfaces. It is packaged in a roll 60 feet long, and is ¾ inches wide, .007 inches thick.

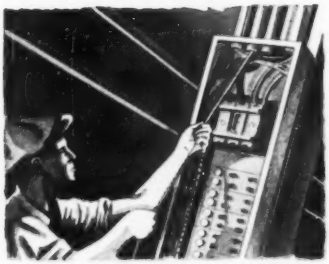
B. F. Goodrich Company, Akron, Ohio.

"Can you imagine the boss asking a question like that?"

We were finishing up the wiring on a big aircraft plant the Government wanted fast. We sure did our part fast. The boss walks up to me, "Why," he asks, "are things going so smooth on this job?"

So I told him—

"First because we've got good men on the job. Then, too," I admitted, "this Triangle wire, cable and conduit we're using helps plenty. Take the hot-dipped galvanized conduit. It bends easily and we've had no trouble with the threads. Couplings go on easy, no burrs or broken threads. Two reasons — one, Triangle makes conduit and couplings right, two, Triangle protects the threads in shipment."



"Then take the circuit wiring. Before we get through we'll pull about a million and a half feet on this job. This Triangle Glazon is good in all ways. It's tough, pulls easy and every coil is perfect. When you pull that much wire, the difference between average and the best means a lot of money in time."

And then I told the boss about the help we got from Triangle and their distributor on this job. "Those two salesmen checked on this job constantly — they gave us all kinds of help in getting the material here when we needed it. Boss, I'll tell you — I'll take Triangle every time."

Ask your electrical distributor— he knows—

It MUST Be Right

THE TRADE-MARK OF TOP QUALITY!

TRIANGLE CONDUIT & CABLE CO., INC.

NEW BRUNSWICK, NEW JERSEY

IT MUST BE RIGHT

Glazon Building Wire • Glazon Non-Metallic Sheathed Cable • Armored Cable • Service Entrance, Service Drop, Varnished Cambric Braided or Leaded, Trioprene Trench, Power and Parkway Cables • Bare Wire • Rigid Conduit Hot-Dipped Galvanized • Electric Metallic Thin Wall Conduit • Flexible Steel Conduit

PORTABLE GREENLEE HYDRAULIC BENDER HELPS BEEMSTER ELECTRIC COMPANY DO PRECISE WORK, SPEED JOBS, SAVE HARD-TO-GET MATERIALS

On its first big job for the Beemster Electric Company, Green Bay, Wisconsin, the GREENLEE Bender more than proved its worth.

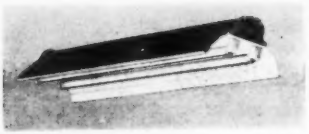
As reported by C. M. Peot, Beemster's manager, their bender at times was taken 200 feet in the air to make "on location" conduit bends atop a large storage elevator. This eliminated need for many manufactured bends, or taking time out for custom bending . . . and, most important, resulted in getting accurate bends that could be fitted in exactly as needed!

Besides the portability feature of the GREENLEE, this contractor also points out that the ram measurement markings let you gauge bend radius accurately for making exactly matching bends. And changes from one pipe size to another are made easily, quickly.

Let the one-man-operated GREENLEE speed and simplify your jobs, too. In minutes makes smooth, accurate bends in pipe up to 5", rigid and thin-wall conduit, tubing, bus-bars. Often pays for itself on the first job. Write for facts today. Greenlee Tool Co., 1749 Columbia Avenue, Rockford, Illinois.

TOOLS FOR CRAFTSMEN
GREENLEE

OTHER GREENLEE TIMESAVING TOOLS FOR ELECTRICAL WORK
Hand Benders • Joist Borers • Cable Pullers • Knockout Tools • Auger Bits and Drills



Lighting Fixtures (32)

A new industrial unit of the 40 watt, two lamp fluorescent type has been announced. Named the Samson, this new Magna-Lite fixture is constructed of heavy gauge steel and die-formed to insure uniform construction. Reflectors in porcelain enamel or baked enamel finish are 12 inches wide by 3½ inches deep, and are designed for maximum light output. The reflectors are attached to the chassis with two shake-proof one-quarter turn wing fasteners, which afford easy removal for cleaning or for access to wiring. Provision is made for either chain or stem hanging. Starters are of the remote type.

Metalcraft Products Co., Inc., Philadelphia 33, Pa.

Reflector (33)

The new Protecto reflector, GBF unit, is available for a variety of industrial and commercial applications. It was designed for use with the new G-E high bay lamp R-52. Reflector and neck are one-piece construction and seven mounting styles are available for installation requirements. The unit is made of porcelain enamel on steel with the whiter-than-white porcelain enamel inside reflector.

Abolite Lighting Division, The Jones Metal Products Co., West Lafayette, Ohio.

Reference Cards (34)

Card-All is the name of this wire-bound reference booklet for engineers and draftsmen. It consists of a number of varnished cardboard cards which contain tables and formulae of engi-

neering and mathematical data constantly used by engineers and draftsmen. Each card is color indexed for ready selection, and the type size makes them easily readable. There is no explanatory written matter on any of the cards. The information includes; tap and clearance drill sizes for screws, sheet metal and wire gage sizes, conversion tables, natural functions of angles, trigonometric formulae, drill sizes, and many other tables and formulae.

General Design Co., 1200 Commercial Trust Building, Philadelphia 2, Pa.

Mirror Light (35)

A new lighting fixture which uses cold cathode fluorescent light and which is free from color distortion has been designed to provide shadowless light for mirrors. This unit, called Mira-Lite, effects uniform light distribution over the full mirrored image and eliminates glare and shadow. Precise control of color characteristics is accomplished by the special combination of gasses used in the Flolite cold cathode lamp. Mira-Lite is designed for standard installation and will fit all mirrors up to 18 inches wide by 24 inches high.

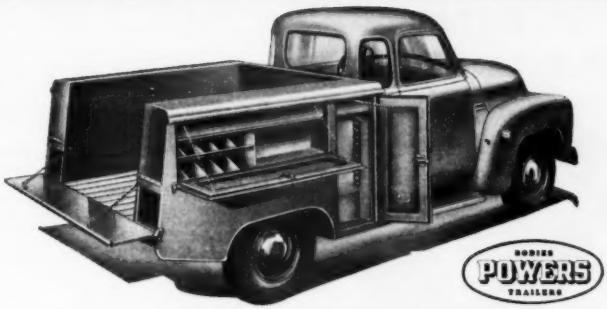
Mobeco, Inc., Watertown 72, Mass.

Transformer (36)

A new line of general-purpose, dry-type transformers is now available with Class B insulation. For single-phase, 60 cycle operation, the new design provides smaller transformers at an average weight reduction of 30% throughout the line. Size and weight advantages are obtained through the use of improved core steels and increased amounts of inorganic insulating materials, requiring less copper and steel per kva of output. This line will consist of about 50 models, 3 kva and upwards.

General Electric Company, Schenectady 5, N. Y.

ARE YOU LOSING $319.37 PER YEAR



or do you have a

Service-Master

"the electrician's service body?"

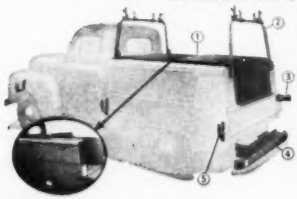
With your present truck you probably spend 15 minutes a day looking for parts or returning to your shop. If your service charge is $3.50 per hour, you lose $319.37 yearly.
Service-Master saves this unproductive time by taking a complete workshop to *every* job. Parts are easy to find—in weathertight compartments which can be locked to prevent theft. What's more, there's plenty of room for bulky items in the larger-than-a-pick-up cargo space. Get further details, today—just mail the coupon below.

Available for immediate delivery in all 48 states

Look at all the features you get in a POWERS Service-Master:

Fully enclosed wheelhousings protect underside of compartments and strengthen side panels; one-piece, ribbed-steel floor distributes weight evenly and prevents sagging at any point; all-steel body shell is electrically welded to form one complete unit; can be mounted on new or used chassis and easily transferred from one unit to another.

OPTIONAL EQUIPMENT



1. Removable overhead rack.
2. Telescopic roof and end-gate enclosure.
3. Removable vise bracket with pipe support.
4. Rear bumper with safety-tread step.
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Send for four-page descriptive bulletin!

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567

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Every Step Under Wagner Control

You get the finest "to work with" when you use Wagner Electrical Fittings. Tough, accurately cast, precision threaded, you're sure of uniform quality when they're Wagner's.

Every step from pattern to flask, to the pouring of molten iron, through machining, plating, sorting and inspecting are Wagner controlled.

Years of specialization, and experience in the manufacture of Malleable Electrical Fittings are a guarantee of dependability. Specify Wagner Fittings and be sure of easier, smoother installations. Nationally distributed through leading wholesalers.

WAGNER MALLEABLE PRODUCTS CO., 222 W. Adams Street, Chicago 6, Illinois. Foundry and plant, Decatur 60, Illinois.

Write today for illustrated Catalog 483. You'll find it a handy reference.

WAGNER
Malleable Fittings

Test Set (37)

A new field test set has been designed to check current transformer installations for short circuited turns, high resistance joints, and grounding. This light weight, portable unit provides testing without interrupting the customer's service and while the load is on. Four current ranges are available; 1.25- 2.5- 5- 10 amperes. This compact unit weighs 2 lbs. and is housed in a non-conducting molded plastic case.

Eastern Specialty Co., 3621 North 8th St., Philadelphia 40, Pa.

Outlet Finder (38)

Working on the magnetic draw principle and designed to locate concealed outlets in steel underfloor raceways, this magnetic outlet finder is placed on the floor surface (wood, concrete or linoleum) and moved about by hand. There is a draw when the finder passes over the steel duct. The draw increases when the finder approaches a concealed outlet and is a maximum when the finder is centered over the outlet. The unit consists of a brass housing which contains a permanent magnet having a floor penetration range of 1½ inches. This finder is compact in size and weighs 2½ lbs.

National Electric Products Corp., Chamber of Commerce Bldg., Pittsburgh 19, Pa.

Lampholder (39)

New lampholders designed for the 150 watt, 300 and 500 watt sealed beam spot and flood lamps are now available with a spring action socket which permits positive electrical contact, snug fit of lamp to lampholder rim, and prevents breakage of lamp due to changes in temperature or because of minor physical variations. Lampholders are of cast aluminum, completely wired and available in two sizes. One model accommodates the 150 watt PAR-38 lamp, while the other is designed for use with the R-40 300 and 500 watt mogul base lamps or medium base lamps with adaptor. Both equipped with stem having ¼ inch tapered thread.

Guardian Light Co., Oak Park, Ill.

Power Tool (40)

The Model 450 stud driver is a newly designed and developed cartridge-powered tool. Controlled energy is generated by a 32 caliber Long rim fire blank cartridge which imparts enough energy to a steel stud to drive it into a steel plate three-quarters of an inch thick, or so snugly imbed it in aged concrete that a pull in excess of 4,000 lbs. is necessary to remove it. This tool weighs a little more than five lbs., can be operated by one man, and has a sustained speed of five or more stud settings a minute in steel, concrete, wood, brick and other structural materials. The operational procedure is such that the tool will fire only to accomplish the work for which it was intended. Complete safety, low recoil and lack of explosive noise are features of this tool. Accessory fixtures adapt this tool to specialized jobs, such as attaching electrical conduit to concrete and steel.

Remington Arms Co., Inc., Bridgeport, Conn.

Cable Reel (41)

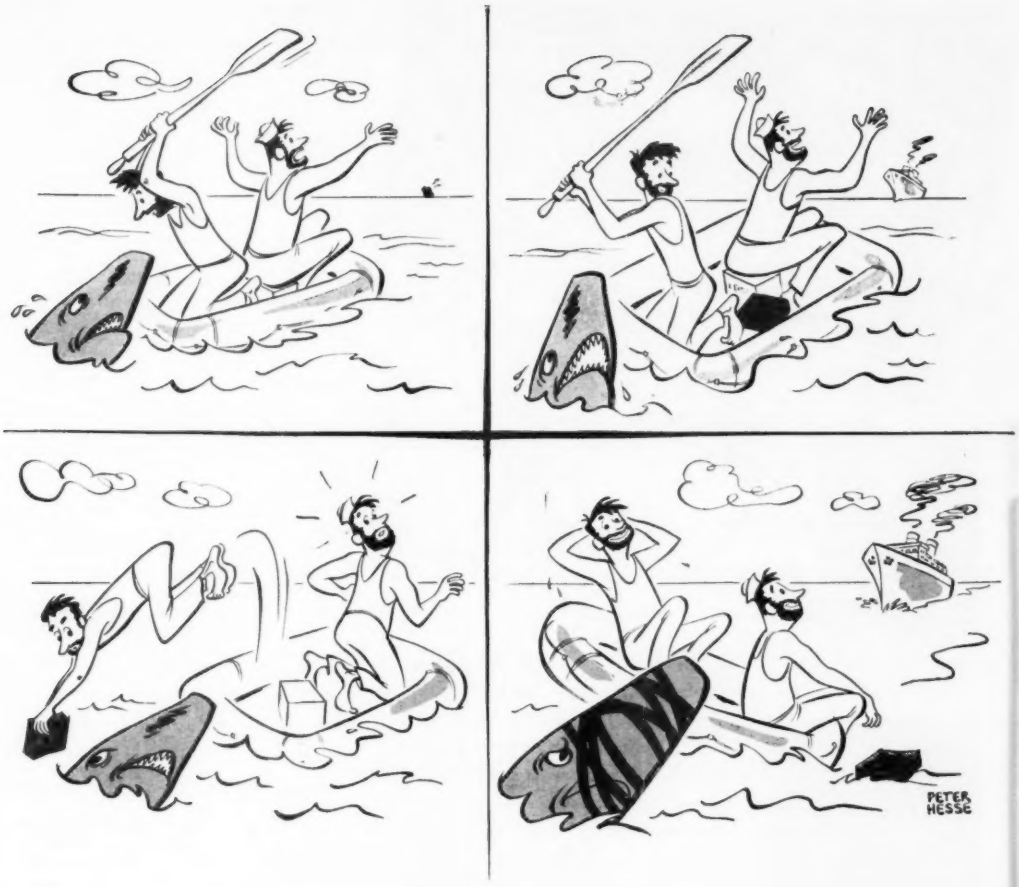
A new compact wall-mounting Powereel has been developed to facilitate efficient handling of heavy electrical cable. Mounted in or on trucks, walls and other places, this reel saves time and labor and reduces cable wear. It has a special mounting flange on the side so it can be fastened to a base securely and solidly by the use of four ½ inch bolts. This flange is threaded to fit a 1 inch iron conduit or afford a water-tight connection for flexible feeder cables. The reel will accommodate cable sizes up to No. 4 four-conductor, and is available with either a 75 amp collector ring for 2, 3, or 4 conductors, or a 30 amp collector ring for up to 16 conductors.

Industrial Electrical Works, 1511 Chicago St., Omaha 2, Nebraska.

Time Switch (42)

For selective switching where variable conditions make complete automatic control impractical, a new line of interval timers is available for commercial and industrial service. Timers may be had for either permanent installation or for portable use. Portable models are rated at 6 or 15 amperes. A single-pole, single-throw normally open ac switch is timed and powered by a self starting synchronous Telechron motor. Switch contacts are of either 20 or 30 amperes capacity. Available time cycles range from 60 minutes to 24 hours. Pilot lights, a signal circuit, by-pass switch, stop switch and extra receptacles may be added if desired.

The Tork Clock Company, Inc., Mount Vernon, N. Y.



YOU CAN DO A LOT WITH A LITTLE JENKINS

Even under the worst conditions, Gold Seal tapes up tight. Electrical men say they can work faster with this tape because it stays "tacky", does not dry out or ravel. And that means more value; Gold Seal *goes further* since there's no waste. You can produce not only better-*taped* joints, but more joints per roll! No wonder it's the best buy in tape. Ask your supplier for Gold Seal, the *quality* tape made by Jenkins Bros. (Rubber Div.), 100 Park Ave., New York 17.

Jenkins Bros. also make Diamond Seal Friction and Rubber Tapes which meet both ASTM and Federal specifications.

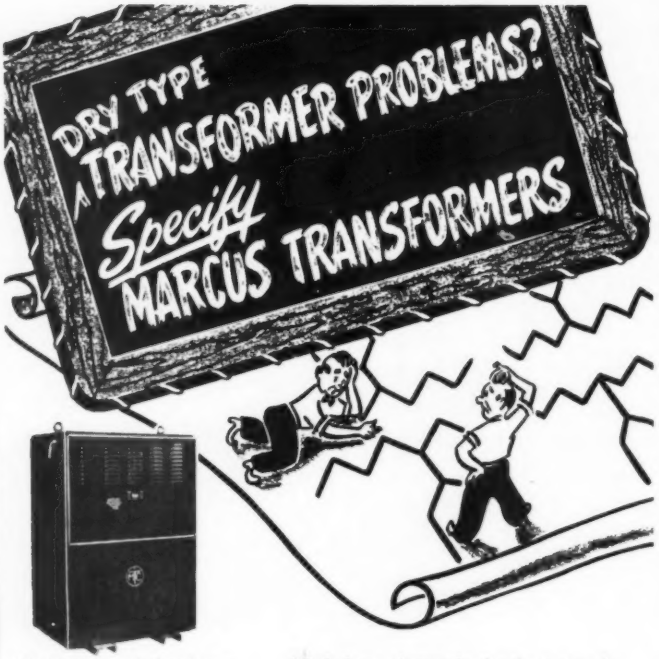
Gold Seal Tape

FRICTION and RUBBER TAPES

Trade JENKINS Mark
Jenkins Bros.

In either 10-roll cartons or single rolls. Every roll cellophane-wrapped.

MADE BY JENKINS BROS. . . . MAKERS OF FAMOUS JENKINS VALVES



100 KVA Type F Transformer
2400/120/240

450 KVA, Type F Unit Substation, 4160 V. Delta, 60 Cycles, 3 ∅— 120/208Y, 4 wire.

Made by a pioneer in the dry type, air-cooled transformer field. Eliminate need for liquid filled units. No hazardous, inflammable oil or toxic liquid to fuss with. Maintenance of oil level, foreign matter, sludge accumulation, and subsequent filtering are relegated to the "horse and buggy days".

MARCUS DRY TYPE, AIR-COOLED TRANSFORMERS

ARE SAFE — No explosion or fire hazards. No fire proof vaults. Class B and C heat proof insulations.

ARE ECONOMICAL — Lower cost installation and operation, negligible maintenance.

For the transformer that's second to none, specify MARCUS.

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS EXCLUSIVELY

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

- DISTRIBUTION
- GENERAL PURPOSE
- UNIT SUBSTATION
- PHASE CHANGING
- ELECTRIC FURNACE
- RECTIFIER
- WELDING
- MOTOR STARTING
- SPECIAL

NEMA

Representatives in Principal Cities

MARCUS TRANSFORMERS CONFORM TO THE STANDARDS OF N.E.M.A. AND A.I.E.E.

MTC

MARCUS TRANSFORMER CO. INC.

39 MONTGOMERY STREET
HILLSIDE 5, NEW JERSEY

PIONEERS IN THE FIELD OF AIR-COOLED TRANSFORMERS

Starter (43)

A new capacity size magnetic starter has been developed which is a size between No. 1 and No. 2 starters in the regularly designated size pattern. Starter is rated at 10 hp, 220-550 volts, 3-phase ac. The specially developed silver contacts of this series (YE) have maximum arc-quenching properties and lowest contact resistance. The terminal boards are molded of arc-resistant alkyd and equipped with pressure connectors.

Furnas Electric Co., 1067 McKee St. Batavia, Ill.

Power Drivves (44)

New larger horsepower Speed-Trol electric power drives have been designed to meet the demand for variable speed drives of 20 and 25 hp ratings. The drip proof model prevents liquids or any foreign material from falling into the motor. Motor housing and variable speed transmission case are made of rugged gray corrosion-resistant iron castings. This unit provides positive adjustment of pulleys, infinite speed variation and accurate control of speed under varying loads.

Sterling lectric Motors, Inc., 5401 Anaheim-Telegraph Rd., Los Angeles 22, Calif.

Cable Tester (45)

A small portable set has been developed for testing various types of cables up to 15 kv. This set also proof tests equipment up to 15 kv—motors, transformers, and similar electrical units. The unit is an impulse or surge device which produces a noise like a pistol-shot at the location of the fault. There are no readings and no calculations; the noise indicates the fault in the insulation of electrical conductors, and determines the condition of electrical insulation by subjecting the cable to instantaneous, but not damaging, high dc voltage. This Faultfinder and dc proof tester has 500 watts input at 115 volts ac, and weighs approx. 145 lbs.

The Electrical Distributors Co., Liberty Trust Bldg., Philadelphia 7, Pa.

Wireholder (46)

A redesigned line of reinforced wireholders has been developed to afford greater mechanical strength than was available in the old type. With a new frame assembly held snugly to the side grooves of the insulator with a copper

rivet, this improved wireholder provides a dead end pull of 1800 lbs., a 90° side pull of 1600 lbs. and a 45 degree side pull of 1750 lbs. All steel parts are hot dip galvanized and the device is available with a dry process white or brown porcelain insulator.

Line Material Company, Milwaukee 1, Wis.

Cable Reel (47)

Built of welded steel tubing and structural forms, the new cable reel No. 480 has been designed to afford maximum convenience and efficiency in handling heavy flexible materials. The inside diameter of the coil is 26 inches. Coil support members are tubular semi-circles which afford large capacity. The open construction of the reel permits tying of coil before collapsing reel. Equipped with oilite bearings, the unit combines strength with light weight, and is finished in dark gray durable, wrinkle baked enamel.

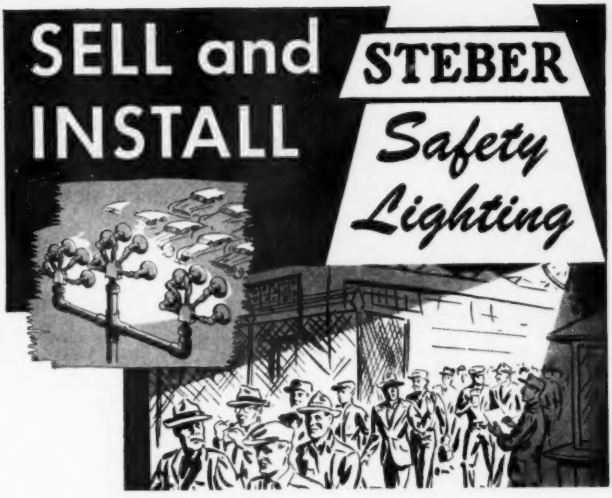
Hykon Manufacturing Co., 163 East State St., Alliance, Ohio.

Product Briefs

(48) Newcomb Audio Products Co., Hollywood, Calif., announces a cabinet type **rack system** for sound units . . . (49) General Electric Co., Schenectady, N. Y., has introduced a new line of 600 volt, indoor-outdoor current **transformers**. . . . (50) To eliminate hazards due to high temperatures, a new line of enclosed **lighting fixtures** has been developed by Lightolier, Jersey City, N. J.

(51) General Electric Co., Schenectady, N. Y., has introduced a new line of single-phase **capacitor induction motors** with a resilient base for freedom from vibration. . . . (52) Baldor Electric Co., St. Louis, Mo., announces an **adjustable-speed motor** system for operation on polyphase or single-phase circuits. . . . (53) Redesigned slimline fluorescent lamp **ballasts** which are smaller in size and lighter in weight have been developed by the General Electric Co., Schenectady, N. Y. . . . (54) The Yale & Towne Manufacturing Co., Philadelphia, Pa., has developed a new industrial **battery charger** for units up to 55 ampere-hour capacity.

(55) New diamond **saw blades** for cutting concrete and asphalt have been announced by the Clipper Manufacturing Co., Kansas City, Mo. . . . (56) A new motor-generator type **battery charger** has been developed by the General Electric Co., Schenectady, N. Y. . . . (57) A new electromagnetic **hammer drill** for hole drilling in concrete, brick and stone, has been announced by the Syntron Company, Homer City, Pa.



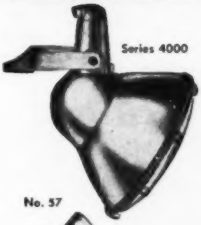
For All Factory and Recreation Areas . . .

As more and more plants take on essential production, better safety lighting will be required for entrances, driveways, shipping and receiving zones, storage and parking lots. Sell and install Steber Better Lighting Equipment for greater customer satisfaction. Steber has the right units for every installation, and will make more sales and profits for you.

These STEBER Lines Meet All Requirements

STEBERLITES

Completely wired, weatherproof, cast aluminum Steberlites are ideal for the protection of vital industrial property and employees. They can be quickly and easily installed in literally hundreds of combinations to supply ample light where needed. Steberlites for Par-38 and R-40 spot and flood lamps can be mounted on poles, walls, outlet boxes, or directly to "T" conduit bodies. Write for Bulletin 120-51.



STEBER FLOODLIGHTS

The Steber line of floodlights sells in large volume to industrial and commercial users—to home owners and for sports area lighting. Open or enclosed types 100 to 1500 watt sizes are available. All are completely wired and fitted with versatile mounting brackets. Illustrated Bulletins 127-50 and 128-50 give complete data. Write for your free copies.

STEBER REFLECTORS

Here's a staple line with high turnover—a steady profit maker. Steber Reflectors are available in Ultranamel or Porcelain Enamel finish, shallow, standard, deep bowl, and sign (angle) types. Write for your copy of Bulletin 123.

STEBER MANUFACTURING CO.
Dept. 98
Broadview (Maywood P.O.), Ill.

STEBER

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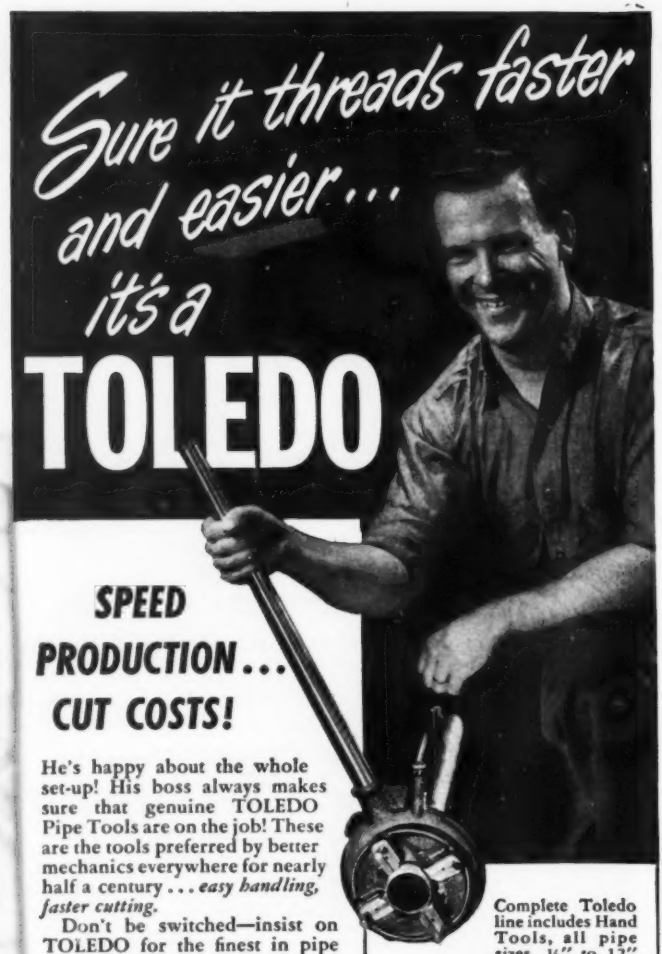
Sure it threads faster and easier... it's a

TOLEDO

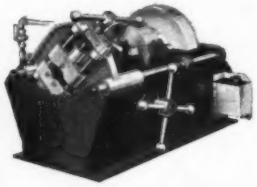


SPEED PRODUCTION... CUT COSTS!

He's happy about the whole set-up! His boss always makes sure that genuine TOLEDO Pipe Tools are on the job! These are the tools preferred by better mechanics everywhere for nearly half a century... *easy handling, faster cutting.*

Don't be switched—insist on TOLEDO for the finest in pipe threading and cutting tools and power machines! See how quickly Toledo dies take hold... how easily they cut smooth, accurate threads. Check the many advanced features of Toledo Pipe Tools... designed to speed the work and assure fast make-up and trouble-free joints. You'll be better satisfied with Toledo dependability! Write for catalog. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.

Complete Toledo line includes Hand Tools, all pipe sizes, ⅛" to 12" and ¼" to 1" bolts. Power pipe machines, up to 2" and 4" capacity. (Above)—Toledo No. 1R Threader, 1" to 2" pipe.



Toledo #999 2" pipe machine, wheel or knife cut-off.

RELY ON THE LEADER

TOLEDO

PIPE TOOLS... POWER PIPE MACHINES... POWER DRIVES

(58) General Electric Co., Schenectady, N. Y., has announced a continuous **sampling monitor,** a new device to make practical the application of continuous sampling methods to **manufacturing** processes. . . . (59) EuteChrom **2X,** a new hard overlay **electrode** which resists severe abrasive wear and friction, is available from Eutectic Welding Alloys Corp., Flushing, N. Y. . . . (60) South Bend Lathe Works, South Bend, Ind., has available new **waterproof plastic covers** for the protection of idle machine tools against the harmful action of grease, water and dust.

(61) Inductograph Products Inc., New York, N. Y., has announced new high voltage dc, rf type **power supplies** with outputs from 1 kv to 60 kv, 50 microamperes to 2 milliamperes. . . . (62) The **Munsell Chart-Photometer,** a compact set of color scales for measuring reflectances quickly and accurately for three standard illuminants, is available from the Munsell Color Co., Baltimore Md. . . . (63) Bonney Forge and Tool Works, Allentown, Pa., has announced a new **thread restorer set** for rechasing battered or damaged threads.

(64) Robert H. Clark Co., Beverly Hills, Calif., has available a new **expansive bit** with a one piece shank for cutting holes from one-half to three inches in diameter in hard or soft wood. . . . (65) The new Scru-Tite **screw anchors** for fastening all types of solid materials such as wood, brick, concrete, glass, metal, bakelite, or any solids, are now available from Master Craft Products, Jamaica, N. Y. . . . (66) Westinghouse Electric Corp., Pittsburgh, Pa., has announced a new **arc drive control** which provides rectifier welders with adjustable arc characteristics. . . . (67) Push-lock type **electric plugs** for connecting portable feeder cables to welding machines are available from Joy Manufacturing Company, Pittsburgh, Pa.

(68) R. C. S. Tool Sales Corp., Joliet, Ill., has announced the new Model T **super saw** which can be powered by an electric drill, an air drill or by standard flexible shaft equipment. . . . (69) A new **hoist-binder** which operates on the ratchet hoist principle, weighs only 10 lbs., and will exert a pull of 3,000 lbs. has been announced by the Coffing Hoist Co., Danville, Ill. . . . (70) **Aircraft pushbuttons** specifically designed for aircraft service in such functions as fire control, turret control, communication circuits, signal systems, and remote control of relays, solenoids and motors, have been reinstated by Square D Company, Detroit, Mich.

(71) A new, **brooder fixture** which accommodates three 250 watt infrared heat lamps and provides a heat pattern sufficient to foster a brood of 250 chicks has been designed by Steber Manufacturing Co., Broadview, Ill.

A new **instrument mounting clamp** which allows removal of the instrument from the dial side of the panel has been perfected by Marman Products Co., Inc., Inglewood, Calif. . . . (73) Tartak-Stolle Electronics, Inc., Los Angeles, Calif., now has available a new type, 117 volts ac (nominal), silver brazing, self-contained **solder pot.**

(74) A new line of standardized twist drill **carbide tips** for drilling cast iron has been announced by Carboloy Dept., General Electric Co., Detroit, Mich. . . . (75) Combustion Control Corp., Cambridge, Mass., offers an all new **Fireye System** to provide complete flame failure protection and programming control for fully automatic gas or oil burners. . . . (76) A new 30-inch **window fan** that will cool four to six rooms at a time has been developed by Robbins and Myers, Inc., Memphis, Tenn.

(77) Rodale Manufacturing Co., Inc., Emmaus, Pa., has introduced a new armored **attachment cap,** molded of bakelite, with metal cord clamp and two parallel blades that fit any standard outlet. . . . (78) A **plastic cover** that slips onto plier handles, giving a firm, comfortable non-skid grip, has been developed by Mathias Klein and Sons, Chicago, Ill. . . . (79) A line of vitreous enamel **power rheostats,** ranging in size from 50 to 500 watts, are now in production at P. R. Mallory and Co., Inc., Indianapolis, Ind.

CATALOGS and BULLETINS

(80) COMMUTATOR MAINTENANCE is subject of file folder discussing resurfacers, brush seaters, grinders, undercutters and techniques for motor repair. Ideal Industries, Inc.

(81) CIRCUIT BREAKER panelboards for the control and protection of lighting, appliances and other power applications, including De-ion breakers for capacities from 10- to 600-amps, are discussed in 20-page booklet B-5260. Westinghouse Electric Corp.

(82) TROLLEY HOISTS, plain or geared, are illustrated, dimensioned and priced on 2-color file sheet by Wright Hoist Div., American Chain and Cable Co., Inc.

(83) TELEVISION distribution system, making it possible for a single antenna to serve multiple outlets and permit the simultaneous reception of different programs on different sets is discussed with text, diagrams and sketches in folder. Electro-Voice, Inc.

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POWER CIRCUIT

TRANSFORMERS

● Modern wiring practice calls for higher voltage main circuits stepped down where required for lighting or operation of portable equipment and controls. This means increased demand for Power Circuit Transformers. So be ready to service this need, and *step up profits.*

Jefferson Power Circuit Transformers are quality built with all the important features that make them the type of Transformer you want to recommend. Ratings are conservatively established to allow a large safety margin. Jefferson's Universal Voltage Ratio Design also makes possible three handy combinations, 460/230—230/115—460/115.

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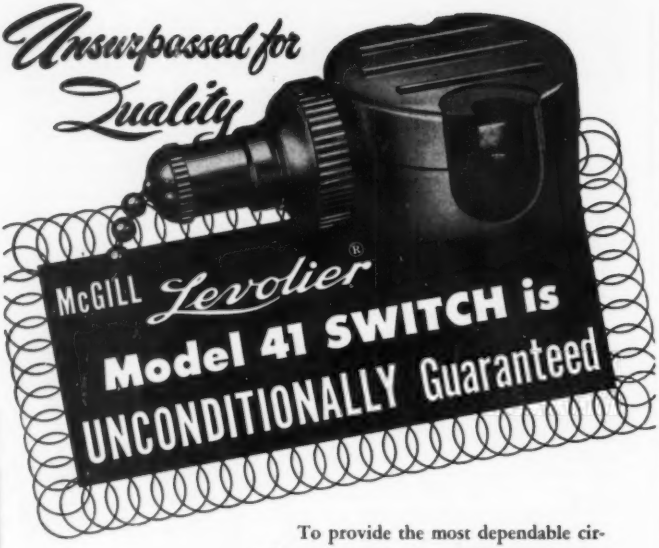

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(84) ROTARY DRILL BITS and attachments for fast, accurate work in concrete are pictured and priced in file sheet. New England Carbide Tool Co., Inc.

(85) INDUCTION HEATER of electronic type and 20-kw size for high-speed annealing, brazing, hardening and soldering of production-line products is presented in publication GEA 5594 by General Electric Co.

(86) ELECTRIC HEATERS of forced air heavy duty type with Btu ratings from 30,700 to 45,000 are discussed in 4-sheet folder published by Kilbury Mfg. Co.

(87) MAGNETIC SWITCHES designed for heavy electrical loads regulated by liquid level controls, electronic switches and interval timers discussed in 4-sheet presentation. Lumenite Electronic Co.

(88) PRECISION SPEED CONTROL with adjustable-speed magnetic drives and new amplifier regutron speed controls is subject of 32-page publication 1107. Electric Machinery Mfg. Co.

(89) POWER INDUSTRIAL TRUCKS are described in an 8-page pamphlet illustrating case studies in rayon- and cotton-plants where bulk goods is processed, stored and shipped by mobile power. Elwell-Parker Electric Co.

(90) VOLTAGE REGULATORS of the low-voltage dry-type induction type are discussed in terms of design, application and operation in publication GEC 795. General Electric Co.

(91) PRECISION SNAP-ACTION SWITCHES, including heavy- and medium-duty limit, explosion-proof, high-capacity enclosed units and actuators, are presented in a condensed circular by Micro Switch.

(92) INSULATED TERMINALS suited to use in cramped quarters where there is the possibility of short circuits developing between adjacent connections on closely-mounted studs are described and pictured in bulletin S4. The Thomas & Betts Co.

(93) SQUIRREL CAGE induction, wound rotor induction, dc, single phase and gear motors, also shafts, pulleys and controls are priced in 4-page folder. Century Electric Co.

(94) DUST-TITE LIGHTING fixtures made of tempered glass to withstand heat and shock, combined with telescopic-action lowering device for quick relamping and easy, safe, cleaning, are presented in catalog released by Appleman Glass Wks.

(95) ELECTRIC HEATERS, including portable and built-in models are presented in brochures M 3204 and 3210. Markel Electric Products, Inc.

(96) WEATHERPROOF FLOOD AND SPOTLIGHT of cast aluminum to hold PAR-38 and R-40 lamps, designed for parking lots, service stations, sign displays and industrial protective purposes, are specified in bulletin 120-51. Steber Mfg. Co.

(97) CONTROL UNIT for banked secondary transformer systems, designed to promote voltage regulation, reduce flicker and provide economical method for paralleling secondaries of adjacent distribution transformers at junction points of minimum load currents, is subject of bulletin 2015 published by Heinemann Electric Co.

(98) INDUSTRIAL FLUORESCENT fixture line, covering 82 combinations including medium bi-pin, twist turret and triple turret assemblies in 4- and 8-foot lengths, low-brightness and Kryton units in 5- and 10-foot lengths, and slimline single-pin units in 4- and 8-foot lengths, are contained in catalog 438. Mitchell Mfg. Co.

(99) BATTERY RACK data sheets giving design specifications for single, double and triple-tier racks for installing 12, 24, 30 and 60-cell batteries are available from Gould-National Batteries, Inc.

(100) BATTERY-CHARGING equipment of the motor-generator type for lead-acid and Edison batteries is presented in bulletin 11-210. The Electric Products Co.

(101) INSULATING varnishes, flexible insulations, plastic tubing, varnished canvas and other materials for motor repair shops are included in bulletin called Low-cost ways to High-quality motor repairs. Irvington Varnish & Insulator Co.

(102) VARTEX VARNISHED and resinous insulations are technically discussed in bulletins 750 (A to F) covering varnished cotton base cloth and tape insulation, straight cut varnished silk, varnished glass cloth, asbestos cloth, silicone resin coated glass cloth and tape insulation, varnished paper and resinous sheeting. Insulation Manufacturers Corp.

(103) ISOMETRIC DRAWINGS made by tracing over the lines of ordinary orthographic drawings with a Vibax drafting machine arm is the subject of bulletin V14 published by the Indamer Corp.

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Watertite insulation and Hazaprene sheath are now teamed up in one cable to give you a simple, sure answer to the bulk of your electrical circuit requirements.

What's so good about Watertite insulation? It has a service record that goes back 20 years. Millions of feet of Watertite rubber-insulated cables have been buried underground or installed under water. These non-leaded cables continue to deliver safe, trouble-free service. Watertite insulation is compounded especially for *maximum moisture and heat resistance* at no sacrifice of electrical and physical properties.

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Permanently bonded together, the Watertite insulation and Hazaprene Sheath form one solid wall of protection against heat and moisture. It will well repay you to investigate the advantages of Watertite-Hazaprene Cables for your circuit requirements. A complete range of sizes up to 2,000,000 CM and for service up to 5000 volts meets most needs. Get the whole story from your Hazard representative, or write today to the Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

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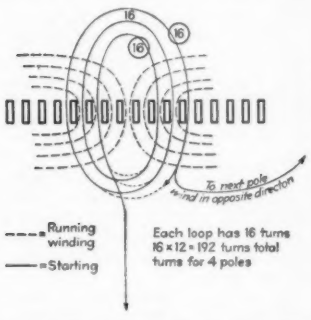
QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repair. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay $5.00.

Reader's Quiz

Motor Winding

QUESTION F18—*I am winding a ¼ hp capacitor single phase (Century) motor 1750 rpm, 36 slots, 115 volts, 60 cycles, drawing 4.2 rated amps. I slipped up on the winding data when I stripped it and I do not know what space or slot to start the starting lead in. There were three loops on the right hand side of the skein. I remember. I have the right data on the running winding. It is the starting winding I am not sure of, and whether concentric-coil type of winding, or progressive type of winding makes any difference?*—L.R.L.

ANSWER TO F18—Use No. 22 wire and make four poles, half way between the poles of the running winding. Each pole will have three loops and each loop has 16 turns. The starting winding pole will use six slots. You can start on either pole and wind in either direction as long as you



reverse the winding on each adjacent pole, the same as the running winding. I think it is easier to wind the inside loop first according to the sketch shown. You might have to reverse rotation by reversing complete starting winding. When completed, just reverse the two leads supplying the four starting poles.—M.C.T.

Brushes

QUESTION G18—*We use a number of dc series motors which are so small that the brush loss appreciably affects the efficiency. At one time we used a grade of brushes on these motors that acted in an unusual manner. When the brushes were first put on, the motors had normal efficiency and output. However, as the brushes became run in and well seated, the motor performance went noticeably down instead of improving. These motors ran very hot and we suppose that use of this particular brush at this high temperature caused some change in the brush which greatly increased the brush loss. What was happening in or at the surface of the brush?*—P.S.

ANSWER TO G18—The difficulty with carbon brushes on series motors is no doubt due to the reduction of spring pressure on the brush caused by the shortening of the brush as it wears in.

Small series motors usually run at very high speed, and a slight reduction in spring pressure will cause poor brush contact and heating of the commutator and brushes, with a consequent drop in speed.—K.D.M.

ANSWER TO G18—As the duty of the dc motors is not mentioned, it is difficult to suggest softer or harder brushes. However, since the efficiency was normal when the brushes were first put on, the fault could be due to a condition that happens quite frequently but very seldom is given any consideration. A highly polished (copper coated with residue metal) brush surface and a highly polished commutator (apparently an ideal combination) will create a vacuum at the contact point causing a drag, due to friction and, on a small motor, result in considerable loss of efficiency.—J.V.H.

Power Factor Correction

QUESTION H18—*Which would be more advisable to use for the correction of power factor? Capacitors on the 2300 volt side, or by the use of divided capacitors distributed on the 440 volt side? This question refers to a main substation of three 165 kva transformers supplied by 23,000 volts stations of three 100 kva at 2300 volts to 440 volt substation and also three 75 kva at 2300 volt to 440 volt. Also, how would one calculate the VARS that is required on either voltage?*—E.H.

ANSWER TO H18—Whether to use capacitors on the high or low voltage side for power factor correction work depends on the specific arrangement in your plant. Where power factor clauses are to be contended with, it is true capacitors are the answer but an equal advantage is the released capacity of wiring with its incident reduced losses and voltage regulation improvement.

Where power factor improvement is the only concern, you can apply capacitors on high voltage side as a unit. This, however, does not help your feeder conditions at all. It is true the higher voltage capacitors are in general more economical than the lower voltage units, however, the higher priced switchgear cost more than offsets this gain over the lower voltage capacitors resulting in a negligible price differential for either method.

Bearing in mind you get advantages of correction from the capacitor towards the source of power indicates that the best all around location for capacitors is at the end of the feeders. A popular location is at the various motor terminals. You get the correction when you need it and when motor is cutout you also cutout capacitor, hence you automatically avoid over voltage possibilities—this also requires no special switching.

If by chance you have adequate wiring and no voltage worries, if you prefer, you can group the capacitors on the secondary side. If this is done do this grouping on the feeders.

With grouped capacitors you may get over voltage on light loads. Therefore on light loads part can be switched out. This can be done manually or automatically.

As far as figuring vars—my suggestion is to refer to a handbook or literature put out by capacitor manufacturers. It is merely a matter of reading a table. Vars on high and low side would be same for correcting purposes.—E.A.M.

Remote Level Indicator

QUESTION J18—*At our plant we have a 200,000 gallon water storage tank that is located some 1000 feet away from the main plant. We would like to install a level indicator at the*

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. . . This blade combines only the positive principles of both fan and blower. The fan element literally scoops up the air and feeds it to the blower element which expels it with great force. Actually, Blo-Fan lowers "shock loss" of the average blower to an irreducible minimum . . . That's why Blo-Fan *moves more air* at moderate speeds than either a fan or blower type ventilator . . .

And, on the subject of speed, Blo-Fan Model 210 is equipped with a 9-speed switch . . .

. . . At low to medium speeds, Blo-Fan handles the normal volume of steam and fumes easily, but for emergencies (like burning the toast or grease in the broiler), turn Blo-Fan to high speed and you can clear the room immediately.

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control board in the plant that would give a continuous indication of the water level in the tank. Have your readers any suggestions as to how this could be handled?—W.P.R.

ANSWER TO J18—The liquid level indication can be attained by using Selsyn devices. A transmitter and receiver are required and power is usually single phase, 60 cycles. Two wires are needed for the fields and three wires for the rotors. A complete system can be bought from a manufacturer or can be made up from war surplus equipment. A standard float is used to actuate the transmitter and the receiver can be remotely mounted on a panel. More than one receiver may be used if required.—J.H.C.

ANSWER TO J18—If it is not desired to know the water level from full to empty, an indicator may be devised very easily. Even if the full range is desired, suitable linkages or "reducing motions" can be worked out, but the question as stated does not give opportunity for suggestions.

If a water line runs from the plant to the tank, the simplest solution would be the installation of a pressure gauge. Knowing the difference in elevation between the gauge and the water level, preliminary calibration of the gauge dial can be made from the relationship:

Feet of water $\times$ 0.4335 = lb./sq. in.

Final calibration can be made by observation. Temperature changes will make a difference to some extent. Readings will also be thrown off by pumps running in the line. The plan will not work if the plant is above the tank.

Small Selsyn indicators have been in the surplus property markets. The transmitting element could be operated by a float. A system of pulleys would have to be arranged to hold rotation under 360°.

A contactor operated by a float could be placed at the tank. Resistors would be connected permanently between the contact points. A voltmeter at the plant, connected in series with the contactor, could be calibrated to height of water.—L.E.B.

Ionization

QUESTION K18—*Is bronze or lead wool considered a suitable filling material to use around uneven bolted connections on high voltage bus bars before taping to prevent ionization of the air that would be trapped beneath the tape if no filling material was used?*

If metallic wool is a suitable material to use for this purpose, how does it prevent ionization since it does not exclude all air?—B.C.M.

ANSWER TO K18—The metallic wool is not used to exclude the air. It is used to remove the needle points in the taped connection which indirectly reduces the ionization of the air.

ANSWER TO K18—Bronze or lead wool is not considered a suitable filling material to use around uneven bolted connections on any voltage (high or low). You would do better if you coated the joint, after it is tightened, with varnish (insulating) which you should have on hand, and then proceed to make small varnish cambric tape rolls to fill between the bolts and lay a layer of varnish cambric tape, then a varnish (insulating) coat. Continue to do this until you have sufficient tape insulation equivalent to the original insulation of the conductor. The varnish insulation will in time harden, so that you will have to chop it off with a hammer and chisel.—O.C.

Transformers

QUESTION L18—*On a single phase line of* 2300 *volts using two* 5 *kva distribution transformers, is it possible to reverse the secondary taps when used in parallel? Is there greater transformer loss in using two* 5 *kva transformers in parallel, or one* 10 *kva alone?*—E.S.H.

ANSWER TO L18—When operated in parallel, transformers must be connected so that their polarities are the same. For greatest economy, their resistances should be inversely proportional to their ratings. Also, their turn ratios and ratios of reactance to resistance should be equal. Detection of these differences is not possible by outward inspection. Design and manufacturing tolerances may cause some deviation, even if the transformers were made by the same manufacturer.

Proper connection can be checked by a voltmeter before the circuit is finally closed. With the transformer primary windings connected to the power source, one side of one secondary is connected to the corresponding lead from the other transformer. A voltmeter is placed between the free lead of one transformer and the corresponding lead of the other. If the reading is zero, the tested leads may be safely connected. If the reading is about double what is expected, polarities are

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TIME SWITCHES

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There's a G-E switch to handle any of these jobs . . . . . or any special application that may exist on the job you're handling right now.

Type T-47 Handy Time Switch. For circuits requiring one ON-OFF operation every 24 hours. Handles ON periods from five minutes to 22 hours.

- Store-window lighting
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- Factory-yard lighting
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- Public building lights
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QUALITY BUILT—
EASY TO INSTALL

Both switches feature large silver contacts and the ever-reliable, permanently lubricated Telechron® motor. Roomy wiring space, simple knockouts, and a mechanism that is easily removed from its case make installations a snap.

Better put G-E time switches on your check list for every job. You can get them from your local G-E distributor. And if you want more details, write for bulletins GEC-535 (T-27) and GEC-578 (T-47). *General Electric Co., Schenectady 5, N. Y.*

Type T-27 is the switch for almost any job. Performs up to 12 ON-OFF operations during any 24 hours. Available with astronomic dial or day-omitting device if desired.

GENERAL ELECTRIC

opposite. Remedy is to reverse *either* the primary or secondary connections of *one* transformer. Any reading of the voltmeter will be a measure of the circulating current that will flow.

One 10 kva transformer would be more economical than two 5 kva units in parallel. First cost would be lower and inherent efficiency higher. Also, any circulating current due to internal ratio differences will reduce the safe available output of a combination.—L.E.B.

ANSWER TO L18—In paralleling transformers, opposite polarities cannot be joined together without short-circuiting one winding on the other. Once the "no-voltage" test has been completed, the polarities have been established and cannot be interchanged without once again testing for polarity. The five "musts" in paralleling are (1) like polarities must be connected on the same terminal, (2) each transformer must have the same ratio, (3) voltage ratings must be the same, (4) impedance must be very near the same, and (5) regulation must be very near identical. Whenever units must be paralleled to carry a bigger load, a certain loss is expected. If the two 5 kva units were used instead of the 10 kva unit, and the ratios and voltage ratings were identical, we must still consider a slight difference in impedance or regulation would cause minor circulating currents which, in turn, increases the copper losses, due to heat. The grade of iron in the laminations and even the cooling oil would have to be identical to cause the two units to perform as efficiently as a single unit.—J.V.H.

Can you ANSWER these QUESTIONS?

QUESTION A19—Our public school system has the Johnson Uni-vent heating and ventilating system in it. The small one-sixth hp motors which run the individual blowers at each radiator are dc and receive their power from a motor-generator set.

Four or five years ago the dc generator reversed its current or lost its permanent field several times within a month and each time we would get it started by hooking a car storage battery in the field winding with the motor-generator set running and it would pick up enough field to run OK. Sometimes it would be gone again after the next overnight shut down and then again it would not bother for a week or so. By testing we could find nothing wrong with the winding or wiring anywhere. After a few weeks of

this it ran OK and has for several years until recently it started acting the same. We repeated the battery hook up in the field and it takes off OK. The method of operating the system has been exactly the same for the past 20 years.

Has anyone had any such experience or a solution as to the cause or remedy for the trouble?—H. C. H.

QUESTION B19—Could any of your readers suggest how we could make up a trickle charger to charge a 6 volt storage battery that is used in laboratory work? We would need about 3 amperes of charging current and it seems like the early radio experimenters used to make such chargers out of material that was handy.—W. P. R.

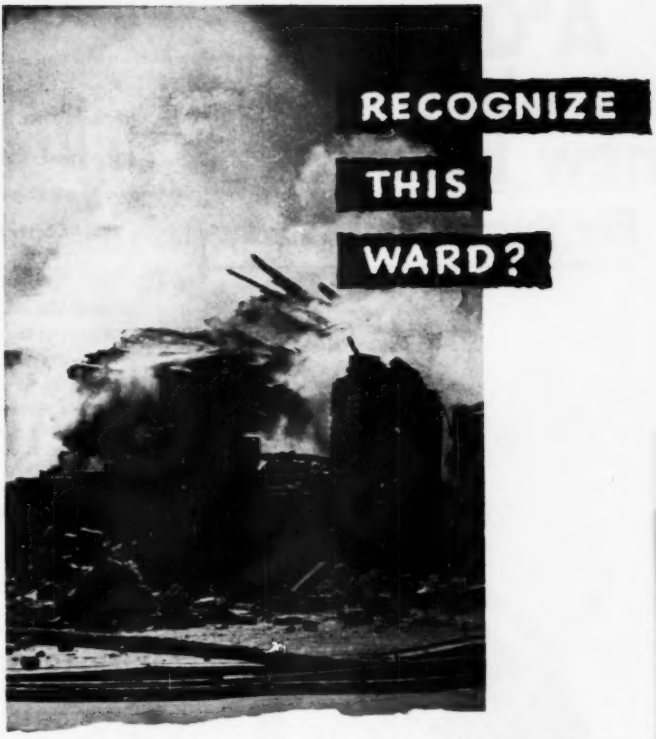
QUESTION C19—What would cause a 480 volt dry type transformer to burn out? This transformer was used to furnish 110 volts for a power saw, and had been in constant use for a month. Source of current is a three phase alternator (transformer was a 3 kva with primary fused at 5 amps).—E. S. H.

QUESTION D19—We have a fire alarm (series) circuit consisting of many thousands of feet of No. 14 AWG wire in a large series loop with a line supply of 55 volts direct current. Now I would like to insert some type of signal into this loop to indicate an alarm when an open occurs anywhere in the wiring of this series loop, or is there any other way of solving this problem?—E.J.K.

QUESTION E19—Which type of wiring is considered the best to install in cold storage buildings? There is considerable objection to wiring in conduit due to the conduit rusting on the inside which results in the failure of the wiring in a short time. and also makes it impossible to pull out old wiring when rewiring becomes necessary. If conduit is used should openings in the system be provided for drainage?—L. E. P.

QUESTION F19—What effect do voltage fluctuations and poor voltage regulation have on the performance and life of fluorescent lamps?—D. H. N.

PLEASE SEND IN YOUR ANSWER BY OCTOBER 15



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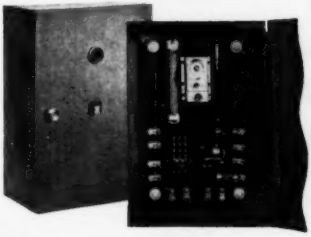

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Electrical Engineer
Fire Underwriters Inspection Bureau
Minneapolis, Minn.

and

B. A. McDONALD
Chief Inspector
New York Board of Fire Underwriters
Rochester, N. Y.

Questions on the Code

House Wiring

Q. *There are being erected in this city some 50 new one story residences and the electrical contractor plans to serve each one of these dwellings with three No. 8's using the standard 60 ampere range cabinet but serving only four circuits as these dwellings will not have electric ranges at least at the present. I have refused to issue the permits for these dwellings as I contend that the dwellings must have at least No. 6 service and even question whether or not the Code will accept only four circuits or one appliance and three lighting circuits even though the actual floor area of the ground floor of each unit will average slightly over 1,000 square feet. I am basing this contention on the fact that these dwellings have full basements and are so designed that an amusement room may be added later. In fact, the contractor plans an unfinished fireplace in the basement of each unit for such an amusement room. Any assistance you can offer in backing up these contentions will be gratefully received.—M.J.D.*

A. Under Section 2304 of the Code, we have the definite statement that service entrance conductors shall be not smaller than No. 6 except when they supply not more than two wire branch circuits or due to limitations of supply source or load requirements by means of special permission No. 8's may be used. Furthermore, in determining the number of circuits necessary in a dwelling, one should include all usable floor area, including basements which are finished. Under Section 2116 you will find the following paragraph:

"In determining the load on the 'watts per square foot' basis, the floor area shall be computed from the outside dimensions of the building, apartment or area involved, and the number of floors; not including open porches, garages in connection with dwelling occupancies, nor unfinished spaces and unused spaces in dwellings unless adaptable for further use."

Therefore, in a dwelling having approximately 1,000 square feet of floor area on both basement and first floor, the minimum requirements of the National Electrical Code would require four lighting circuits plus an appliance circuit. In addition, while it is not required as yet by the National Electrical Code, one should provide a separate circuit for the heating system. Many cities already have provisions within their electrical ordinance which require a separate circuit for the heating plant and if your ordinance does not provide this special circuit, it would be well to give serious consideration to revising it to that extent. While we actually are confronted with the minimum requirements as contained in the Code in the wiring of dwellings, it seems also most essential that serious consideration be given to the running of a separate circuit to the laundry area especially in view of the increased use of automatic washing and drying equipment today.
—G. R.

Service Disconnecting Means

Q. *There is one Code rule that I could never understand and that is under Section 2351 of the N.E. Code. There is to my mind no reason for this rule which permits more than one service disconnect means. Will you kindly explain the reason for this rule?—R.J.M.*

A. Section 2351 of the Code which covers the requirements for the service disconnecting means, represents an endeavor by Code authorities to cover the various conditions and situations, which have arisen during the past 30 years of a rapid and vast development in the use and application of electricity. Many an "Old Timer" remembers the day of only one main service disconnect and the argument in support of same that, in case of fire, the fireman could easily disconnect all wiring in the building from the electrical supply and thus eliminate the hazards of electrical shock to those fighting the fire. Today, even though there may be several services to one building, this hazard is satisfied by the Fire Department who have the necessary equipment and knowledge to disconnect the outside conductors feeding the building. In many cities, the electrical utilities respond to fire alarms and will disconnect electricity to burning properties when requested by the Fire Department. As a result, this part of the problem is satisfied.

At the present time, the Code recognizes six means of service disconnect in place of one, on any service to a building. It also recognizes five service drops to a building for the following use: fire pumps, emergency lighting, capacity requirements, buildings of large areas and multiple occupancy buildings. I believe you will agree, for example, that it is far more important to have a separate service of electrical supply for emergency lighting than it is to have one main switch that controls all electricity feeding the building.

During the past 30 years the increase in the use and application of electricity has resulted in enormous load increases in many types of occupancies and I believe it is good practice to serve such occupancies through more than one main switch. As an example, an ordinary department store today may require 1200 amperes for general lighting and power, 1200 amperes for air-conditioning and 600 amperes for escalators. I believe it is far more practical to supply such loads through three service switches than one. On larger store installations, the requirements run into much larger figures, 10,000 or 20,000 amperes. It is obvious that such large capacity requirements must be split up into smaller units.

There is so much to be said on this subject of multiple service switches and multiple services that time and space are not available to cover the subject. I hope I have, however, justified the present Code requirements for multiple service disconnects and multiple services.—B.A.McD.

Plug Fuses

Q. *A two wire No. 12 circuit has been extended about 25 feet to a 30 ampere two plug fuse safety switch to supply 220 volts to a water heater. Now, must I demand that the cabinet of this two fuse safety switch be grounded or that a third wire be run from the neutral to the neutral terminal block in the switch, or that*

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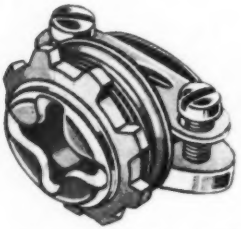

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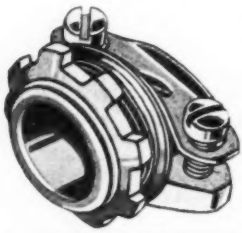

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they change the switch and utilize one suitable for cartridge type fuses?
—D. A. O.

A. We believe your question pertains to whether or not plug fuses may be used on a two wire 220 volt circuit. If you will note the wording under Section 2403 of the National Electrical Code, you will find the following sentence:

"Plug fuses and fuseholders shall not be used in circuits exceeding 125 volts between conductors, except circuits of a system having a grounded neutral and no conductor at more than 150 volts to ground."

Therefore, in your installation you have the grounded neutral system to the building involved and the water heater circuit is simply a two wire circuit carrying 220 volts to the water heater itself. If this circuit is contained within a metallic raceway system which will provide a ground for the water heater and its control switch, ordinary plug fuses may be used for the protection of the two ungrounded conductors. If a nonmetallic wiring system is used, plug fuses may still be employed; however, it would be extremely advantageous to extend the neutral to the water heater in order that it may be utilized as a grounding conductor to lessen the likelihood of a high voltage surge causing a burnout.—G. R.

Grounding Frames Of Ranges

Q. *Ranges are received here with a three wire flexible (so called) pigtail with the range frame grounded to the common ground which has the approval of the N.E.C. Some electricians remove the three wire pigtail and replace it with a three wire armored cable pigtail using the armor to ground the range frame. Some use four wire flexible pigtail, the green wire to ground the range frame to the wire protecting armor. In a recent survey we found several armored pigtails pulled out from the connector. In four of the buildings the ground clamp just ahead of the water meter was corroded or broken and completely disconnected. I would like to know which method of range frame grounding provides the best protection in the home. Is it a good practice to rewire an electric range which bears the Underwriters' label?—G.A.B.*

A. Section 2560 of the Code covers the requirements for grounding the frames of electric ranges. This section refers us to Sec-

tions 2557 and 2559 for the answer and definitely recognizes grounding the range frame to the grounded circuit conductor.

Section 2559a of the Code recognizes the use of the metal enclosing the conductors, provided an approved multi prong plug or equivalent is used, one prong for the purpose of grounding the metal enclosure and provided that the metal enclosure is attached to the plug and to the equipment by connectors approved for the purpose. This provision would not be satisfied in my opinion if ordinary armored cable or flexible conduit with ordinary fittings were used. Household electric ranges may be frequently moved during the year and they are not secured in a fixed position. As a result it is possible to pull the cable out of an ordinary connector and thereby open the path to ground.

During the past several years the use of the three wire non-metallic range cable, connected to a range receptacle and using the grounded circuit conductor for grounding the range frame has been used to a considerable extent. The field experience with this method of grounding ranges is extremely good and I personally believe that this method is the best of those offered by the Code. In making this statement, I have in mind the fact that the range circuit is usually short and the conductors are large so that the possibility of breaking the ground conductor is remote and if it was broken, the range would become inoperative. It also follows that the neutral grounded conductor is a more reliable path to ground than a metal enclosure which we know from experience, unless maintained, does become inoperative due to loose connections or broken fittings.

It is my opinion that the rewiring of an electrical range by others than the manufacturer would void the approval of the Underwriters Laboratories. This, of course, is not good practice in my opinion.—*B.A.McD.*

Receptacles

Q. *A number of the farmers are now asking that lock type receptacles be located in the outbuildings and on the yard pole in order that they can plug in their various portable devices without fear of the cap on the portable cord falling away from the receptacle. Will the Code permit the use of a twist type or locking type receptacle for farm work?*—A. B. P.

A. As yet there is no specific reference contained in the National Electrical Code to receptacles

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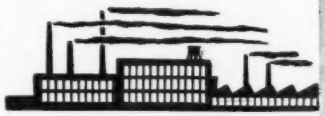

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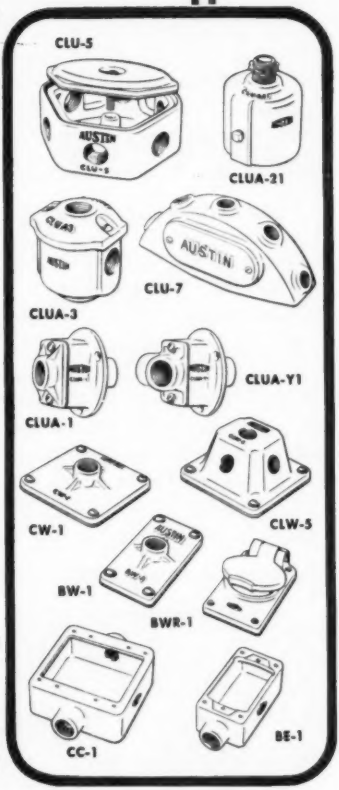

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located on farm properties where they may be utilized over the earth or grounded floors. However, many R.E.A. Cooperatives and at least in one state definite rules have been promulgated which prohibit the use of any locking type of receptacle in any room or area where it may be used to supply a portable device over either a grounded floor or outdoors, the reason being strictly one of life safety inasmuch as a lock type receptacle and cap cannot be readily broken apart in the event of an electrical fault occurring and shocking the operator of the portable device.

You will note under Section 5105 of the Code provisions for receptacles in garage wiring specifically prohibit the use of a connector which will not readily break apart to provide this same protection for the operator. Undoubtedly this rule will be extended to cover farm wiring at some future time and in the interim it seems advisable to use only receptacles which may readily be disconnected in the event of trouble.

—G. R.

Wiring In Textile Mill

Q. *In a textile plant we have machinery that is moved around from time to time, and to feed these machines with 440 volts three phase, our fuse cutouts are in the basement on the ceiling. These machines are being fed with BX through a concrete ceiling 8 inches thick and terminating with a BX connector, under the wood flooring in a space about 6 inches high, and into a conduit coupling or sleeve, and conduit continued on through the wood flooring and to the switch of the machine. Will the Code permit this or must we use conduit all through? If we are to drill holes to satisfy the location of machines, the time involved will be great also the ceiling full of holes. We can fill these holes up but won't this weaken the structure? I have recommended bus duct for flexibility and accessibility but nothing has been done about it. What have you to suggest or advise in Code regulations? —G.J.S.*

A. According to Section 5006 of the Code some parts of textile mills are classified as Class 3, Division 1 locations. This would include any part where easily ignitable fibers or materials producing combustible flyings are handled, manufactured or stored. According to Section 5073 of the Code, the wiring method for a Class 3, Division 1 location is rigid conduit.

Section 3342 of the Code prohibits the use of armored cable in any hazardous location.

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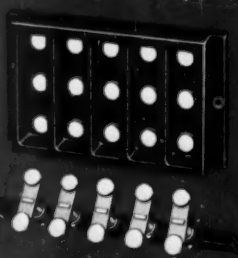
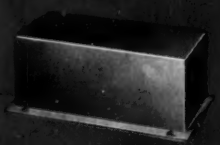


Close-up of stationary contact block and movable contacts.



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Section 3005 of the Code requires cable assemblies to be continuous from outlet to outlet or to fitting.

Section 3007 of the Code requires a box at each outlet, switch or junction point of armored cable.

Section 2435 of the Code requires the location of overcurrent devices to be readily accessible, and the definition of readily accessible would eliminate locating same on ceilings where it would be necessary to use chairs, ladders etc, to reach same.

Section 5087 of the Code covers grounding in a Class 3, Division 1 location. This section refers us to Section 5066 and if you refer to this section, I believe you will agree that armored cable and armored cable fittings would not satisfy this section as a means of grounding the equipment to which it is connected. Where voltages of 440 volts are involved, a violation of this requirement could result in serious fire and life hazards.

Section 3642 of the Code does not permit busways to be used in a hazardous location.

I believe all of these Code rules are involved with the problem you have presented and in reply to your question, I have the following comments to make:

1.—It is my opinion that the entire installation should be made with rigid conduit on the basis that Section 5006 of the Code requires same, that the method of changing from armored cable to rigid conduit is in violation of Section 3005 of the Code, that the method of grounding equipment through armored cable and the fittings you describe is in violation of Section 5087 and 5066 of the Code.

2.—It also appears that the location of overcurrent devices on ceilings would be in violation of Section 2435.

As a result of the foregoing, I would strongly recommend that the job be wired with rigid conduit, and since busways cannot be used in a hazardous location, you should proceed to drill holes as you plan, bringing the conduits from overcurrent device panels located in readily accessible locations. If there is any question concerning the number of holes to be driven in the concrete, consult an architect or the Supt. of Bldgs. for advise. If they feel that such holes seriously weaken the floor structure, it may be necessary to locate the panels on the floor where the machinery is located and bring the branch circuits to the machines from that point. Such panels must meet the requirements of Section 5074. Another method to eliminate many holes through the concrete would consist of bringing several circuits through one conduit and branching out to individual machines from the floor above.—B. A. McD.

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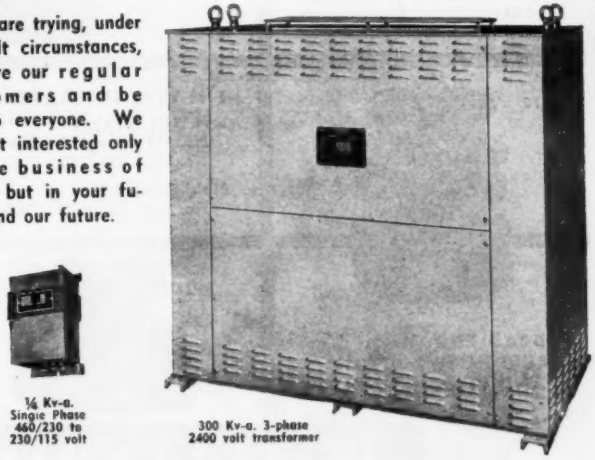
We are trying, under difficult circumstances, to serve our regular customers and be fair to everyone. We are not interested only in the business of today, but in your future and our future.



300 Kv-a. 3-phase 2400 volt transformer

¼ Kv-a. Single Phase 460/230 to 230/115 volt

Sales Engineers in Principal Cities

SORGEL ELECTRIC CO., 836 W. National Ave., Milwaukee 4, Wis.

Pioneers in the development and manufacturing of Air-Cooled transformers

APPROVED FOR R.E.A. USE

No. 1261

SUSPENSION TYPE INSULATORS

Dead End	No. 1261, 6" dia.
Ball and Socket	No. 1253, 10" dia.
Clevis Type	No. 1270, 7½" dia.
	No. 1271, 10" dia.

REINFORCED WIREHOLDER INSULATORS

Reinforced Type	No. 1937 2¼" Screw
Reinforced Type	No. 1937-3 3" Screw

No. 1937

No. 101

SPOOL TYPE INSULATORS

Secondary Rack	No. 101, 1¾" dia. Groove
Secondary Rack	No. 96, 3" dia. Groove
Service Rack	No. 100, 1⅜" dia. Groove

GUY STRAIN INSULATORS

No. 502, No. 534, No. 536, No. 538, No. 540 — Use dependent upon strength and cable requirements

No. 502

No. 175

PIN TYPE INSULATORS

One Piece Pin Type

No. 135 No. 175 No. 253
No. 261 No. 266

Multi-Part Pin Type

No. 2027 No. 2045 No. 2055

No. 261

DEAD END CLAMPS, SUSPENSION CLAMPS AND FITTINGS

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

Write for Complete Information and Prices

Wire Tap

Q. *In the April issue of* Electrical Construction and Maintenance, *you carry a question on residential wiring. In there you stated that where a 20 ampere circuit is desired, a No. 14 wire tap may be run to an individual outlet. Where in the Code is permission granted for such a tap?—J.D.M.*

A. The National Electrical Code under Section 2121-C-2 grants permission to utilize a No. 14 wire tap from a No. 12 wire circuit. You will note here that the Code states the tap should be limited to 18 inches in length and this rule is no doubt justified whenever such a tap is utilized to supply the ordinary convenience outlet as the load which may be connected is often of an unknown quantity.—G. R.

Underground Cable

Q. *Recently I was asked to inspect the installation of about 85,000 feet of direct lay cable. This cable was already purchased and approved and I had the installation inspection only. I cannot associate these types with anything in the Code. May I ask your opinion?*

You will notice Types RW, RR, and USE. The type RW is listed in paragraph 3102 of the Code but I cannot associate the others with anything in Article 310, or elsewhere.—L.E.M.

A. According to the above information and the manufacturers' tags enclosed with your question, the cable in question is service entrance cable, approved by the Underwriters Laboratories under their designation USE. This type cable is approved for underground installation. The particular cable in question "Durasheath" is provided with an overall neoprene sheath and the conductor insulation is type RW. This particular cable in addition to underground use, may be used outdoors, overhead or on the sides of buildings exposed to the sun.

Section 3102 of the Code covers the various types of insulation for conductors. The term USE is not shown here because it is the U. L. term for identifying a cable and not any particular form of insulation. Other types of service cables are identified by U.L. as S.D-SE and ASE. These types do not appear in the Code for the same reason.

The marking RR is a manufacturer's designation which indicates that the insulation meets the RW-RH requirements of Underwriters Laboratories and that the cable when used in wet locations rates as type RW at 60° C

and when used in dry locations rates type RH at 75° C. Up to the present time, I know of no N.E. Code recognition of such a dual purpose insulation and to become official it should be listed in the Table under Section 3102.

There is no question, however, that the cable in question is approved by U.L. as type RW insulation at 60° C. —B.A.McD.

Interim Amendment No. 91

"Section 4322. CONTINUOUS DUTY MOTORS.

a. More than one Horsepower.

b. Substitute the following for the text of the 1951 edition.

A protective device integral with the motor which is responsive to motor current or to both motor current and temperature. This device must be approved for use with the motor which it protects on the basis that it will prevent dangerous over-heating of the motor due to over-load or failure to start. If the motor current interrupting device is separate from the motor and its control circuit is operated by a protective device integral with the motor, it must be so arranged that the opening of the control circuit will result in interruption of current to the motor".

Interim Amendment No. 92

A proposal from the National Production Authority pertaining to the reduction of requirements covering the amount of zinc for the protection coating on Electric Metallic Tubing, was duly considered in accordance with the Procedure for Interim Amendments to the National Electrical Code. The proposal was referred to Underwriters' Laboratories, Inc., with the suggestion that affirmative action be taken and the expression that no change in the National Electrical Code was necessary for such action. As a result, a Bulletin was issued by Underwriters' Laboratories, Inc., on May 31, 1951, quoted in part as follows:

"A bulletin on this subject dated May 10, advised the Laboratories' Electrical Council and the manufacturers of labeled electrical metallic tubing that the National Production Authority had requested Underwriters' Laboratories, Inc., to modify present requirements covering the amount of zinc for the protective coating on labeled electrical metallic tubing. The subject was discussed with the Electrical Committee of the NFPA and with most of the manufacturers subscribing to the Label Service for electrical metallic tubing; and, as a result, the Laboratories indicated that the current requirement, which calls for zinc capable of with-

[*Continued on page* 186]

DONGAN POWER CIRCUIT TRANSFORMERS

•

FOR LIGHTING AND OPERATING MACHINE TOOLS

•

Circuits for the lighting and operating of machine tools can be more quickly installed by using Dongan Transformers, running branch circuits from the power line instead of installing a separate circuit for each machine tool.

This method is safer too—because Dongan Transformers insure a completely isolated circuit.

WRITE FOR NEW CATALOG

DONGAN ELECTRIC MFG. CO.

2980 Franklin Detroit 7, Mich.

The Dongan Line
Since Nineteen-Nine

DONGAN TRANSFORMERS

Delta AIR LINES select Leader fixtures!

DELTA AIR LINES
Leader's OFFICER—Has plastic louver and translucent plastic side panels for efficient light diffusion and beauty of appearance. Precision engineered. Easy to install and service. For 2, 3 or 4 40-watt lamps or Slimline lamps in lengths from 48" to 96".
VL-440

Delta Air Lines Ticket Office
Sheraton-Gibson Hotel,
Cincinnati.

Zay Smith, A.I.A., architect and designer; Fred L. Schille, general contractor; Becker Electric Co., electrical contractor. Fixtures furnished by the F. D Lawrence Electric Co.

Leader fixtures bring distinctive lighting to this new Cincinnati ticket office

LEADERALL moulded plastic ceiling grilles may be suspended at any desired height to form a rigid, level ceiling of light. Use with any type fluorescent fixtures. Do not interfere with air conditioning or sprinkler systems.

Delta Air Lines, in their search for the finest in illumination for their new ticket office in Cincinnati, chose Leader fixtures to provide: 1) optimum light for working surfaces; 2) soft border lighting; 3) spot-lighting; 4) even overall illumination with shielded light source.

The attractive lighting layout involves the use of a variety of Leader fixtures, including OFFICER fixtures, used over the ticket sales counter, and a LEADERALL louvered ceiling for pleasing overall lighting.

If you, like Delta, want the finest in fluorescent lighting, look to Leader . . . first!

Sold and installed by the better electrical dealers and contractors

Leader *America's No. 1 Lighting Equipment Manufacturer*

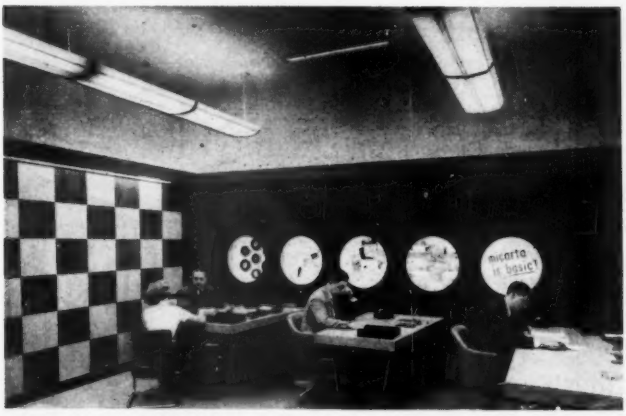
LEADER ELECTRIC COMPANY • 3500 North Kedzie Avenue • Chicago 18, Illinois

Leader Electric—Western: 800 One Hundredth Avenue, Oakland 3, California
Campbell-Leader, Ltd., Brantford, Ontario, Canada

Modern Lighting

ARTIFICIAL SUNLIGHT floods this general office area. Fluorescent sunlamp units (arrows) are mounted to ceiling between fluorescent lighting fixtures.

FLUORESCENT SUNLAMPS are replaced as easily as fluorescent light tubes. In this private office, two 20-watt and one 40-watt units have reflectors which direct rays toward desk locations; are controlled by separate switch.



OFFICE OF THE FUTURE has walls finished in Micarta—a laminated plastic—of various patterns; doubles as display room. Note sunlamp on ceiling.

New Office Brings Sunlight Indoors

An office unexcelled from the standpoint of health, morale and efficiency, is the way Fred T. Whiting, Westinghouse Electric Corporation vice president describes the company's new 46,000 square-foot headquarters in Chicago's Merchandise Mart. Basis for this statement are the following design features:

Newly-developed fluorescent sunlamps irradiate the entire office area. Germ-killing Sterilamps are installed in the ventilating system.

Bright colors on the walls provide cheerful surroundings.

Acoustical soundproofing, modern fluorescent lighting and complete air conditioning add to employee comfort.

A small cafeteria solves the "morning coffee" problem.

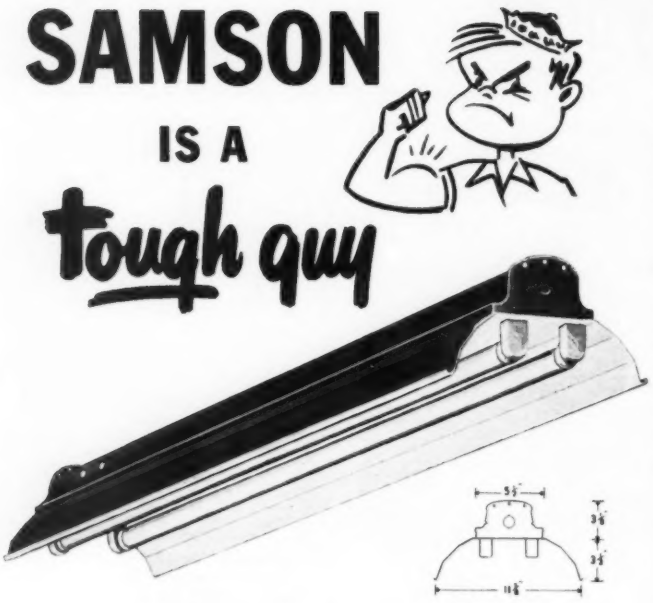
Westinghouse reports that, so far as is known, this is the first time any office of such size has installed sunlamps to benefit all employees. A total of 220 of these new fluorescent units are mounted on the ceiling over all working areas. In general offices the lamps produce, in an eight-hour day, the equivalent of 15 minutes in the summer sun. In private offices—where the executive is away from his desk more frequently and often out of town—concentrating reflectors aim the fluorescent sunlight in stronger doses. The executive can turn the units on or off at will; can get a sun-tan in several hours if he chooses.

With these lamps providing the nearest approach yet achieved to the actual ultraviolet content of sunlight, Westinghouse engineers consider this cheap insurance against winter absenteeism caused by the common cold. Annual cost of operating one 40-watt lamp of this type is only a little more than one dollar.

Supplementing the sunlamp system are a total of 80 germ-killing Sterilamps installed in the office ventilating system. Similar wall-mounted units are placed in the office cafeteria and wash rooms. These lamps produce ultraviolet in the bactericidal range and kill air-borne germs.

Continuous rows of fluorescent fixtures are suspended from the acoustical tile ceilings; provide an average illumination level of approximately 60 footcandles.

SAMSON IS A tough guy



...He's our new 2-Lamp, 40-watt

FLUORESCENT INDUSTRIAL UNIT

We could have made him a lightweight—but that's not the MAGNA-LITE way. Instead, we gave him a die-formed body and reflector of heavy gauge steel—the kind he needs to stand up under the punishment he'll take. He provides maximum light output, is quickly installed and easily maintained. No wonder he's a champ!

Porcelain enamel or baked enamel finish. White inside, gray outside. Instant start type also available. Half-turn "Shakeproof" wing nuts. Specially inserted die-formed socket plates. Cross members for extra rigidity.

the Magna-Lite line

METALCRAFT PRODUCTS CO., INC. • Manufacturers of Fluorescent and Slimline Luminaires • **Mascher & Lippincott Sts., Phila. 33, Pa.**

A general conference room, seating 100 persons, has a fully equipped stage and a moveable podium from which a speaker controls the lights by a push-button station and signals the movie projection room.

To avoid monotony, not a single office has all four walls decorated the same color. Various shades of red, green, blue, yellow and brown, as well as two tones of gray have been used. One office, which also serves as a display room, has wall made of different patterns of Micarta—a laminated plastic material manufactured by the company.

In general, the company officials believe their new office represents "the most advanced step yet taken to improve the lot of the office workers and increase efficiency."

Vertical Lighting For Wall Map

Sales and traffic managers using wall maps or charts can improve the lighting efficiency and effectiveness by noting a lighting technique developed and used by the Westchester Division of the Consolidated Edison Company of New York. The wall map in their Mount Vernon control room is magnetic, and is a huge enlargement of an aerial photograph showing the Division's activities. Being magnetic, small metal plaques can be moved over the surface of the chart at will, and remain in any location until manually pushed to a new position. Each metal plaque on the Westchester Division

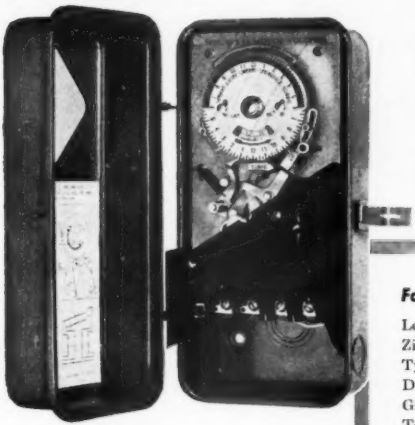
MAGNETIC WALL CHART in the Mount Vernon office of Consolidated Edison Company of New York's Westchester Division is top lighted by six rows of fluorescent lamps mounted behind inclined panels of Foto-Lite glass. Approximately 40 footcandles are delivered to the vertical plane, making it possible for dispatchers to note position of company vehicles accurately and quickly.

SANGAMO the Time Switch with the *Automatic Memory*...

A Sangamo Astronomic Time Switch controls the circuits for the protective flood and yard lighting in this defense factory. Other types are available for practically any conceivable industrial use.

is often the answer to the timing needs OF INDUSTRIAL PLANTS

The growing shortage of available industrial manpower makes automatic devices with which to control manufacturing processes more important than ever. The Sangamo Time Switch is such a device. It will solve practically any problem concerning daily sequence timing in industry. Protective floodlighting control is a typical example where the Sangamo Time Switch eliminates the need for human attendance. So is the use of these switches for the control of pre-heating before workshifts, or the continuance of certain process cycles after workshifts. Below are a few suggestions where Sangamo Time Switches can serve industry.



The operation of this Sangamo Astronomic Time Switch automatically compensates daily in accordance with sunset and sunrise.

INDUSTRIAL APPLICATIONS

For daily pre-heating:

Lead pots for solder operations.
Zinc for injection molding.
Type metal in type foundries.
Dies in plastic molding presses.
Glue in woodworking shops.
Tanks for galvanize dipping.
Electric ovens and furnaces.
Infra-red paint dryers.
Electronic testing equipment.
Soldering irons on assembly lines.

For daily circuit control:

Yard floodlights.
Runway and hall lights.
Electric factory signs.
Pumps, compressors.
Water softeners.
Mixing equipment.
Electric doors and gates.
Air conditioning.
Alarm systems.
Exhaust fans.
Electric valves.
Two-level thermostats.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

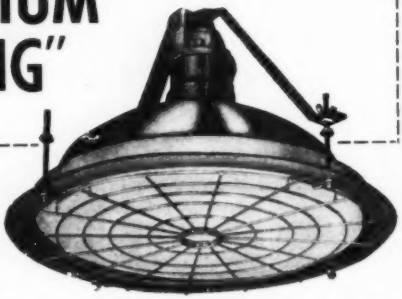
Get the full story—write for Catalog No. 1010-A today.

ST51-7

QUAD
LIGHTING UNITS

"We are doing well in sales with QUAD

GYMNASIUM LIGHTING"



This flush mounted QUAD UNIT for gymnasium lighting is going over big in many territories because it has the lighting efficiency and the required durability.

Reflector is steel, porcelain enameled and is removable from the cast aluminum socket fitting. The latter is tapped at side for ½-inch connectors for rigid or flexible conduit. All units are complete with heavy tinned wire guard and may be ordered with or without glass covers. Also included are necessary nuts and bolts for attaching to ceilings of various thickness up to three-inch maximums.

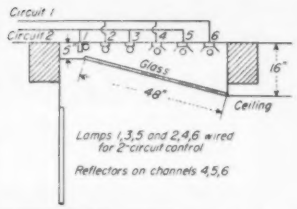
- **Assembly Halls . . . Roller and Ice Skating Rinks . . . Armories, Etc., are added sources for sales.**

Withstands shocks and rough treatment encountered in gymnasiums.

Here are the features that make customers and profit for you.

1. **Design improved**
2. **Serviced from above or below ceiling**
3. **Detachable porcelain enameled reflector**
4. **Angle iron plaster ring**
5. **Adjustable for variable ceiling thickness**
6. **Dust tight glass cover optional**
7. **Heavy wire guard**
8. **Tops in appearance**

QUADRANGLE MFG. CO.
325 S. PEORIA ST. CHICAGO 7, ILL.



FLUORESCENT ROWS are wired for 2-circuit control and three outer rows are equipped with porcelain enameled asymetric reflectors to kick light towards chart face. Incline of glass panel reduces brightness in direction of observers, improving the seeing conditions in the wall-map area.

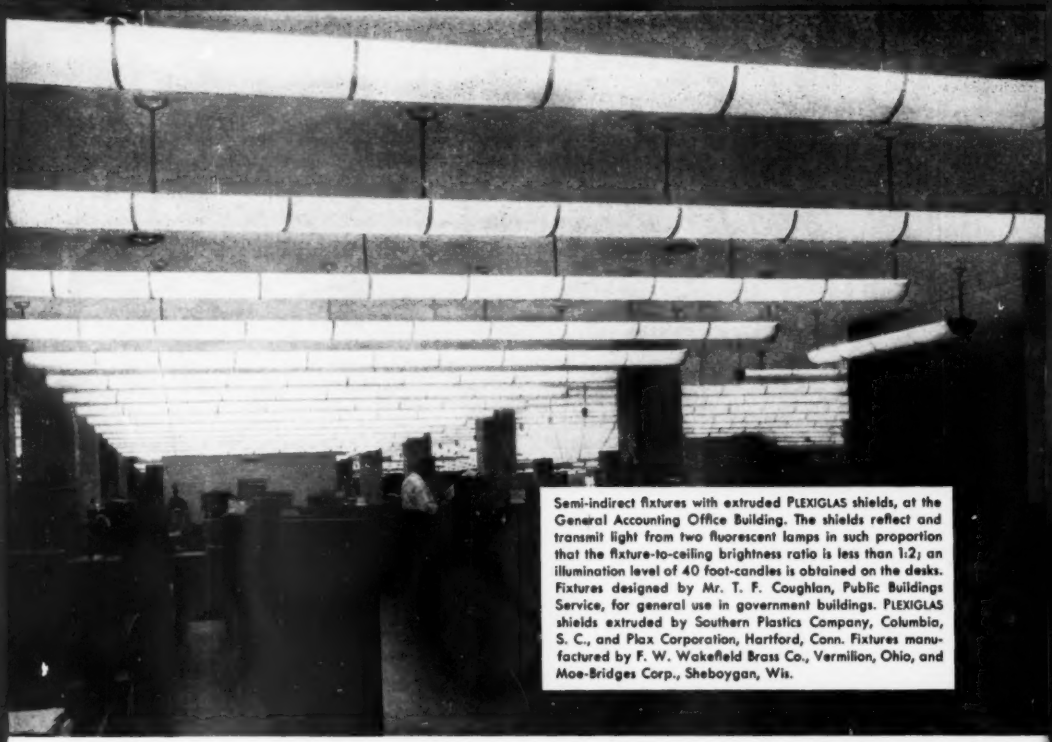
map represents one of their 50 service trucks or vehicles, each one of which is provided with two-way radio-telephone facilities permitting drivers and office dispatchers to remain in constant contact. As service cars move around the territory, they keep the dispatcher accurately posted so that, in the event of emergency service being required, the dispatcher can instantly note the car nearest to the trouble point, contact the driver by radio-telephone and direct him to the desired address.

An average lighting intensity of 40 footcandles on the vertical plane illuminates the surface of this chart. The lighting installation was by the Kent Manufacturing Company who used Corning's Fota-Lite glass for directional control, and built the installation in accordance with the design by R. H. MacVean and E. L. Kosmider of the Mount Vernon office.

The lighting installation consists of six rows of 40-watt 4500-degree white fluorescent lamps mounted end to end. To punch the light towards the wall, the three outer rows are backed by porcelain enameled asymetric reflectors and, to provide for two-level lighting during periods of use and non-use, alternate rows are wired together on two separate circuits. The Fota-Lite glass is sloped at about a 30-degree angle so that the shielding angle is increased and observers are relieved of strain due to excess panel brightness.

Hi-Bay Incandescents For Bank Modernization

In modernizing the main area of the Central National Bank of Cleveland's Prospect Avenue building, architects Graham, Anderson, Probst and White of Chicago recommended the removal of some ornamental hanging lighting fixtures and the installation of high bay incandescent fixtures as a replacement. The resulting lighting plan, developed



Semi-indirect fixtures with extruded PLEXIGLAS shields, at the General Accounting Office Building. The shields reflect and transmit light from two fluorescent lamps in such proportion that the fixture-to-ceiling brightness ratio is less than 1:2; an illumination level of 40 foot-candles is obtained on the desks. Fixtures designed by Mr. T. F. Coughlan, Public Buildings Service, for general use in government buildings. PLEXIGLAS shields extruded by Southern Plastics Company, Columbia, S. C., and Plax Corporation, Hartford, Conn. Fixtures manufactured by F. W. Wakefield Brass Co., Vermilion, Ohio, and Moe-Bridges Corp., Sheboygan, Wis.

At the General Accounting Office Building . . .

Extruded PLEXIGLAS Shields

Nearly thirty-three thousand fluorescent fixtures, with twenty-five miles of translucent PLEXIGLAS shields, light the new General Accounting Office Building in Washington.

Extruded from PLEXIGLAS acrylic molding powder, the shields are important to the successful lighting of the building. They *reflect* light to the ceiling, to create large-area, low-brightness, indirect illumination. They also *transmit* the proper proportion of light needed to maintain a minimum brightness ratio between the luminaires and the ceiling.

From luminaires to luminous ceilings, white translucent PLEXIGLAS contributes to better lighting. Available in the form of flat or corrugated sheets, and as molded or extruded sections, this durable acrylic plastic provides uniform diffusion and efficient transmission of light—*plus* excellent color stability. In addition, the light weight and strength of PLEXIGLAS give freedom from breakage during installation and maintenance, and safety overhead in service. We will be glad to tell you how PLEXIGLAS can be used in your next lighting installation.

CHEMICALS FOR INDUSTRY

ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries

PLEXIGLAS is a trade-mark, Reg. U. S. Pat. Off. and in principal foreign countries.

Canadian Distributor: Crystal Glass & Plastics, Ltd., 130 Queen's Quay at Jarvis Street, Toronto, Ontario, Canada.

KAYLINE
the one source lighting line

LIGHTING . . .
NO PROBLEM

Lighting is no problem when you use Kayline's catalogue #50. You'll find in this big, illustrated catalogue modern lighting fixtures of every type . . . incandescent, fluorescent, slimline — fixtures of distinctive design coupled with quality and a price that's low — fixtures for every lighting use . . . commercial, industrial and residential. Write on your business letterhead for your copy of Kayline's catalogue #50.

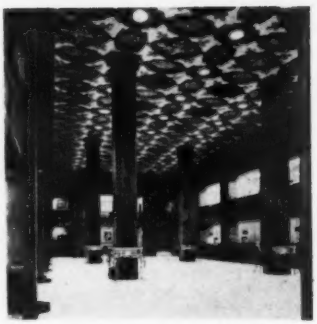
See Sweet's Architectural File Section 31A-12

THE KAYLINE CO.
2840 E. 22nd St., Cleveland, Ohio

KAYLINE
the one source lighting line

by General Electric engineers W. E. Conley and T. C. Sidlo, was installed by the Hatfield Electric Company of Cleveland. By replacing the ornamental hanging fixtures, the problem of maintaining the system was greatly simplified and, by installing 33 ceiling-recessed units to replace the existing three bronze luminaries, illumination was raised in intensity and more evenly distributed over the public space.

Ornamental medallions in the 38-foot ceiling were cut out to provide openings for 18-inch Miller Hi-bay alzac reflectors containing 750-watt PS52 incandescent lamps. Concentric louvers provide a 45-degree shielding angle, and intensities at tellers' cages and check desks is now an even 30 footcandles. Equipment is served from catwalks constructed above the ornamental ceiling.



RECESSED 750-watt units, shielded by concentric louvers, are mounted on a 10½-by-12½-foot pattern in the 38-foot ceiling to provide 30 footcandles of lighting to check desks and teller cages.

Relighting Boosts Jewelry Sales

When Hermans Jewelers of Jackson, Mississippi, decided to architecturally remodel their Capitol Street store, they recognized the importance of good lighting as an attraction and sales agent. As a result, the lighting plan was considered first, and structural changes were designed around the lighting equipment.

As installed, a combination of recessed fluorescent and incandescent lighting provides general illumination in the main sales area, while the low-ceiling rear-store section is illuminated by recessed incandescent downlights fitted with concentric louvers. Wall cases are lighted with single-lamp fluorescent strips, and counter-top displays are highlighted from above by adjustable incandescent downlights in swiveling sockets.

Structural features at first presented a problem, for the ceiling was furred along one side of the store and definitely dropped towards the rear. These problems were solved, however, by recessing fixtures into the furred and dropped sections to high light special jewelry settings.

The economic wisdom of remodeling and relighting is attested by greatly increased sales.

RECESSED FIXTURES containing both incandescent and flourescent lamps provide general illumination and high-level local lighting in the Hermans Jewelers remodeled store in Jackson, Mississippi.

Average Light Intensity Increased **9** Times

Litecontrol Fixtures Made the Difference!

JOB: Nachman's Department Store, Newport News, Virginia.

DISTRIBUTOR: Noland Company, Newport News.

FIXTURES: No. 5628 2 lamp slimline surface fixtures, using Holophane® No. 9100 lenses, and diffusing glass side panels. No. 5600-22 corner boxes, using Holophane No. 774 lenses.

ROOM FINISH: Walls, dusty rose; ceiling, light gray.

CEILING HEIGHT: 18 feet.

INTENSITY: 45 footcandles in service, average.

Modern in every other respect, this department store had one serious problem: low visibility, the average light intensity was 5 footcandles.

Expert technical counsel resulted in the installation of LITECONTROL Lighting Fixtures. In this case, No. 5628 Slimline Surface units.

Average light intensity today is 45 footcandles, 9 times as great as before.

This is but one of the many hundreds of cases where *standard* LITECONTROL Fixtures improve sales-vision, effectively and economically.

A LITECONTROL consultation can very often help do a better job of putting the right fixture in the right place for the right light. On your very next problem, call in your LITECONTROL man . . . and *see*.

LITECONTROL *Fixtures*

KEEP UPKEEP DOWN

LITECONTROL CORPORATION, 36 Pleasant Street, Watertown 72, Massachusetts

DESIGNERS, ENGINEERS AND MANUFACTURERS OF FLUORESCENT LIGHTING EQUIPMENT DISTRIBUTED ONLY THROUGH ACCREDITED WHOLESALERS

ELECTRICAL CONTRACTORS

The advertisement reprinted at right is currently appearing in SUPER SERVICE STATION magazine.

This ad is designed to keep your customers abreast of the newest and best lighting equipment for their particular requirements.

It is designed to HELP YOU SELL QUALITY LIGHTING EQUIPMENT!

YOU KNOW that it PAYS to sell QUALITY equipment, because it is not only trouble-free for your customers, but *TROUBLE-FREE* FOR YOU, TOO!

CASH IN on the added interest in quality service station lighting units created by these messages!

BENJAMIN **has a complete** *PLANNED SERVICE STATION* **LIGHTING PROGRAM to help you sell more quality equipment to this market.**

WRITE TODAY for complete details of this profitable plan, as well as FREE COPIES of the IMPROVEMENT BOOKLET mentioned at right to distribute to your service station prospects!

BENJAMIN ELECTRIC MFG. CO., DEPT. H DES PLAINES, ILL.

get extra "sales punch"

the economical way with versatile, trouble-free

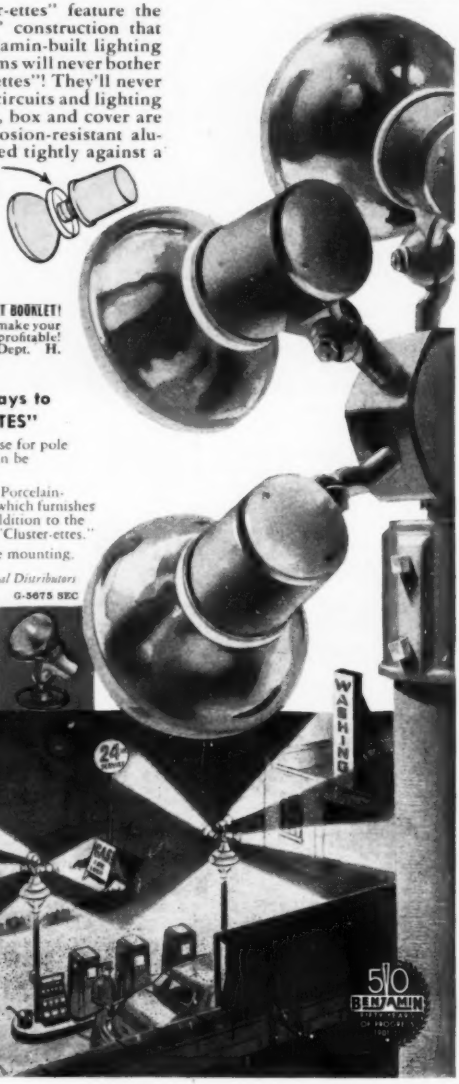
BENJAMIN

"Cluster-ettes"

Specify Benjamin "Cluster-ettes" for that extra "lighting punch" that draws more customers! Then you'll not only cash in on this new way to attention-getting supplementary light for signs, approach drives, pump islands, price panels or other areas you want to "punch up"—but you'll be *maintenance-trouble-free!*

For Benjamin "Cluster-ettes" feature the "built-like-a-battleship" construction that is typical of every Benjamin-built lighting unit. Rain, snow or storms will never bother these rugged "Cluster-ettes"! They'll never rust out or cause short circuits and lighting interruptions. Housing, box and cover are made of rust and corrosion-resistant aluminum; lamps are sealed tightly against a weather-proof silicone rubber gasket; and all wiring is completely enclosed.

Designed for the popular PAR and R40 spot and flood lamps. These lamps are easily adapted to many lighting jobs.



send for
FREE SERVICE STATION IMPROVEMENT BOOKLET!
Hundreds of ideas on how to make your station more attractive, more profitable! Benjamin Electric Mfg. Co., Dept. H. DesPlaines, Ill.

take your pick of 3 ways to MOUNT "CLUSTER-ETTES"

1. On 1½" or 2" slip-fitter base for pole mounting. 2 to 5 lamps can be mounted in this manner.
2. Combined with Benjamin Porcelain-Enameled "Column-Lite" which furnishes good "area" lighting in addition to the "punch" lighting of 2 to 5 "Cluster-ettes."
3. For individual wall or pole mounting.

Sold Exclusively through Electrical Distributors

G-5075 SEC

Industrial Electrification

Why Use Adjustable-Speed Drives?

Because they . . . .

1. Step up production rates
2. Make machines more adaptable; more versatile
3. Improve product quality
4. Cut waste material
5. Lower operating costs
6. Can be operated by inexperienced operators, and
7. Save floor space.

By H. M. Kenny
General Electric Co.
New York, N. Y.

EVER since individual motor drives began to replace line shafts and belts, the need for better control of drive speeds has been recognized. In a few large industries this need has been met through the use of adjustable-speed motors, but many smaller industries are still overlooking the many advantages that can be obtained with this available equipment. Since 1940 the development of adjustable speed drives has been rapid and, if all industrial machines now requiring speed adjustment were actually so equipped, American productivity could, conservatively, be increased by 10%. The small extra cost of adjustable-speed drives would also increase the return on machinery investment, for they would enable certain machines to process a greater variety of goods at a faster rate and with less maintenance and operational supervision.

Adjustable-speed operation can be simply illustrated by the common electric food mixer having different speeds for mixing cake batter, mashed potatoes, milk shakes and the like. Without adjustable-speed control the mixer would not be the versatile machine it is, and each housewife would need several single-speed mixers to do a comparable job.

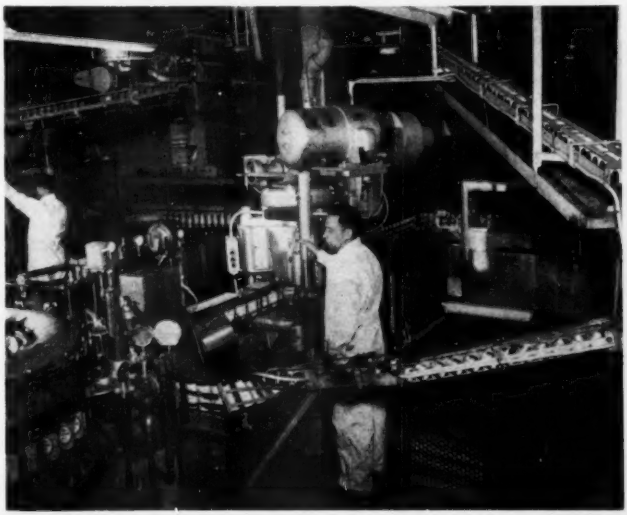
Enlarging this concept to include industrial applications, we find adjustable-speed drives ideally suited to mixing paint, rubber, plastics and similar materials, with speeds inversely proportional to the viscosity of the material being mixed. By changing the speeds as the viscosity changes, fewer machines and mixing vats are necessary; greatly reducing plant capital.

But adjustable-speed applications are not limited to mixing machines. Today they are increasing production on wire-winding reels, textile processes, punch presses, lathes, boring mills, conveyors, centrifuges, printing presses, extruders, paper machines, grinders, planers, food machinery, kilns, pumps, box-making machines, drawout tables, lumber carriage drives, ball mills, test equipment and lots more. From steel mill to small machine shops, adjustable-speed is becoming the most effective single weapon for stepping up production without expanding plant facilities.

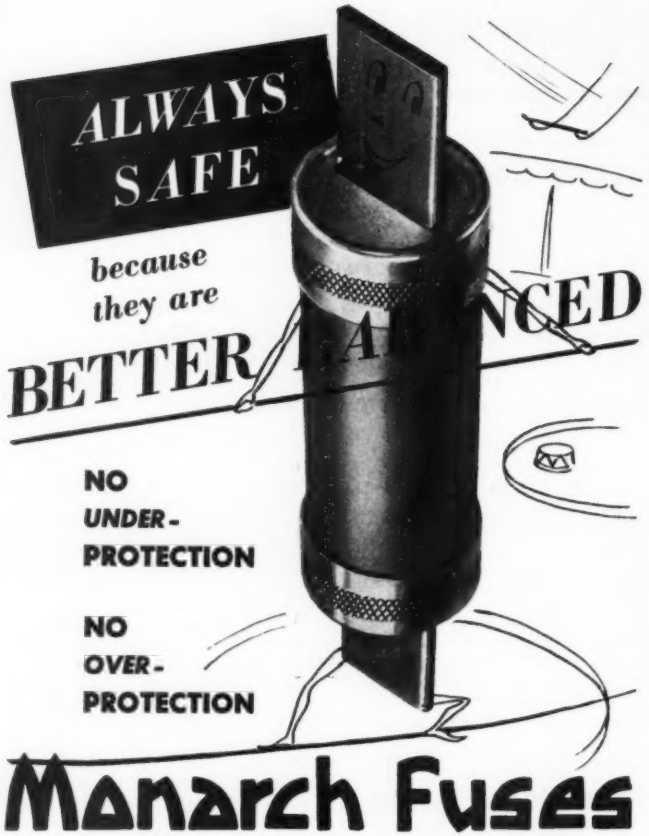
Advantages Are Many

1—Adjustable-speed drives can *step up production*, enabling each machine to do every job at speeds best suited to the work, the skill of the operator, and the machine itself. This gives maximum efficiency per machine and per man-hour. On drives that handle materials in varying batches, varying sizes and varying shapes (such as winding reels, lathes, conveyors, extruders, etc.), adjustable-speeds furnish output-upping answers.

2—Adjustable-speed makes it possible to take full advantage of new materials, designs and tools, improved processes and new automatic devices by permitting the free selection of speeds best suited to each new changeover in the plant. This is currently important due to changeovers resulting from shifts to defense work, but even



OPERATION costs of this conveyor system are reduced through finger-tip selection of variable speeds for filling and capping cans.



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A *"Better Balanced"* fuse is your only true assurance of dependable fuse protection. This means that your electrical circuits receive a safe balance between the dangers of "over" and "under" protection,—those characteristics that are liable to burn out equipment because of excessively long lags . . . . or interrupt production because of frequent blow-outs. Yes, Monarch renewable fuses give you that safe "Better Balanced" feature . . . . including the temporary lag feature of Monarch's replaceable "mono-lag" link. So for *dependability* on all your electrical circuits, specify *Monarch fuses* . . . . fully approved by Underwriters Laboratories.

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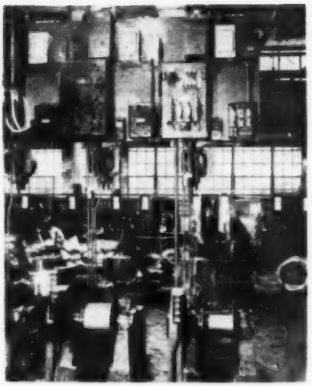
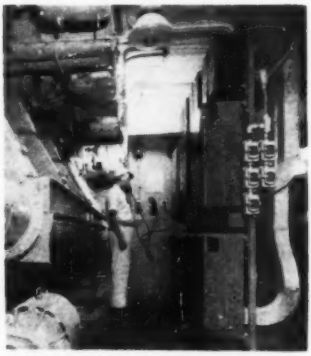


PRODUCTION was increased 300 percent when these wire rewinders were equipped with individual adjustable-speed drives for operating the bobbins.



VARIETY of high-quality blends is possible in this milling plant using 14 adjustable-speed drives to provide precise speeds over wide range.

in normal times, assembly lines must be adaptable to economic and technological changes. The solution lies in utilizing multi-purpose machines, with adjustable-speed drives providing this necessary *versatility and adaptability*.

3—In many instances, adjustable-speed drives actually *improve the quality* of the finished product, for speed is frequently the most critical variable in the manufacturing process. In fact, in processes such as wire drawing, paper making and coating, speed control is practically synonymous with quality control.

4—It naturally follows that these drives can *cut waste of material*, by matching the speed of the machine to the skill of the operator, resulting in less spoilage and fewer rejects. In operations like cutting, slitting, shearing and coating, speed control maintains closer tolerances, resulting in material savings.

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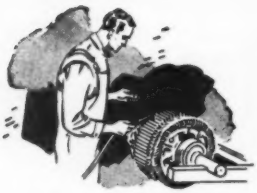

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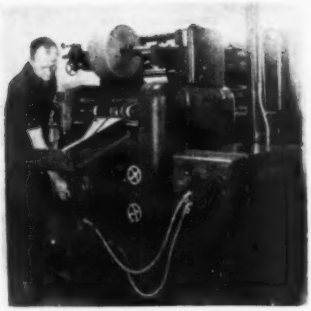


QUALITY of printing on this press is controlled with adjustable-speed motor; slowing machine for better inking on quality jobs and for starting press.

ECONOMY of material is obtainable on this fine wire-drawing machine, for gradual coming-up-to-speed prevents jerks, wire breaks and waste.

5—In spite of rising machinery costs, adjustable-speed drives can *reduce budgets* for modernization or conversion. Old, constant-speed machines may be converted into modern multi-purpose units, simply by installing appropriate adjustable-speed drives. In many cases adjustable-speed improves machine versatility to the point where fewer machines are required.

6—The use of *inexperienced operators* is another factor to consider, for such persons can be employed to control critical manufacturing processes that have been simplified to the push-button stage by adjustable-speed.

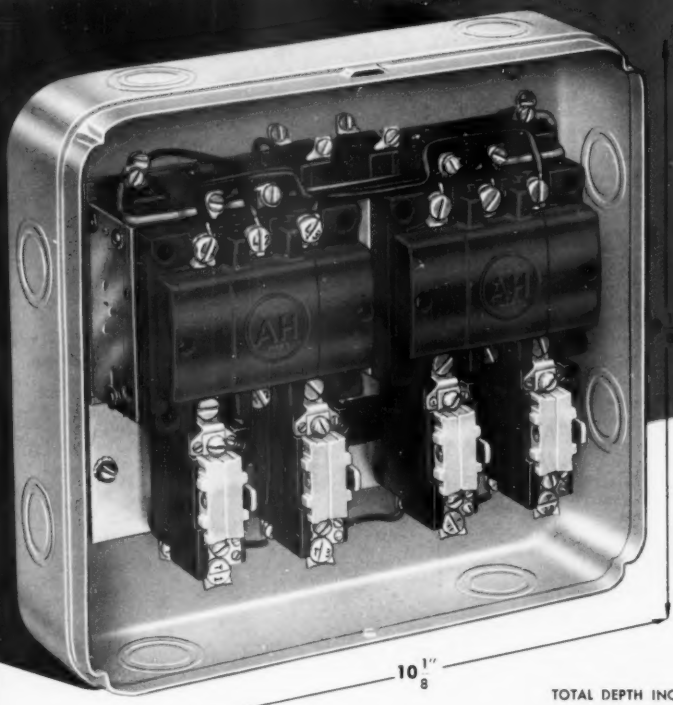
7—Finally, packaged adjustable-speed drives can *save floor space* in the factory, permitting greater production in the same area.

Several Drives Are Available

The simplest available type of adjustable-speed drive is the multi-speed induction motor, available from 3- to 75-hp. Stepless speed control is obtained by merely turning a speed-control knob that shifts a set of brushes.

ARROW AH HART

MULTI-SPEED and REVERSING MOTOR STARTERS



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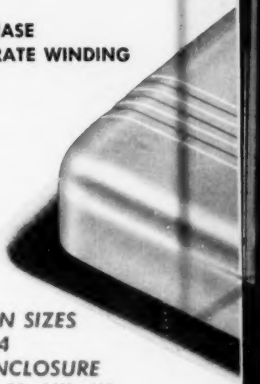
- SMALL SIZE
- LIGHT WEIGHT
- POSITIVE INTERLOCK

SIZE 1 — 3 PHASE
2-SPEED SEPARATE WINDING
NEMA TYPE I



Wherever A.C. across-the-line type of motors are employed, the advanced design of Arrow-Hart Multi-Speed and Reversing Starters will assure maximum rated performance and long motor life. The revolutionary "RA" design is years ahead of present day solenoid type controls — a fact acknowledged by more and more design-engineers, electricians, distributors and buyers. An exclusive A-H balanced knee-action bellcrank fulcrum mechanism accounts for superior operating performance in just ½ the space required by conventional controls — ½ the weight, too. Other features include 50 to 60% better arc resistance; big, rugged contacts; straight-thru front wiring; positive mechanical interlock; overload protection; easy to wire and easy to service. Be convinced! Write for folder complete with operating features, dimensions, ratings and other information.

AVAILABLE IN SIZES
0, 1, 2, 3, 4
IN NEMA ENCLOSURE
TYPES I, IV, V, VII, IX

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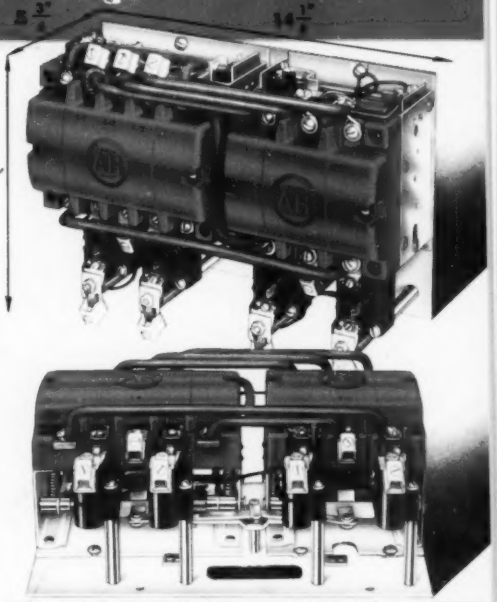
EXCLUSIVE "RA" DESIGN

FIRST TO BRING YOU STRAIGHT-THRU FRONT WIRING PLUS POSITIVE INTERLOCKING DEVICE.

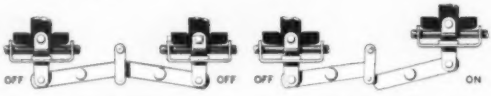
Arrow-Hart Multi-Speed and Reversing Starters, affording unusual flexibility with reliability, are available in multi-speed for separate wound motors or consequent pole for reconnected type motors and reversing, in single phase, two or three phase and two phase four wire. Sizes 0, 1, 2, 3 and 4. One single 2-speed, consequent pole reconnected type can be used with constant torque, variable torque or constant horsepower motors.

SIZE 3 — 2 speed reconnected winding — 3 phase, note location of positive interlock (in "OFF" position). Wiring diagram points up simple straight-thru front wiring with vertical overload relays.



POSITIVE MECHANICAL INTERLOCK

Free release transfer action consistently true. This principle positively prevents closing of both sets of contacts of an interlocked control at any one time. Special roller type, free-floating deflective linkage assembly is positioned on a braced and true structure, eliminating binding or sluggish action. Reverse contacts do not close until forward contacts are completely open.

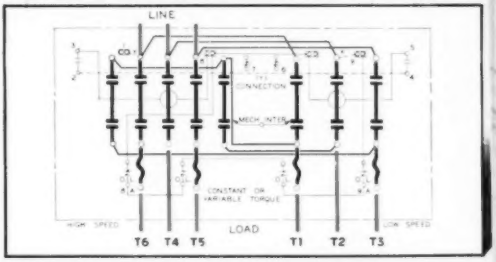


OFF POSITION ON POSITION

STRAIGHT-THRU ALL THE WAY

Huge savings in space, time and work are accounting for growing acceptance of Arrow-Hart motor controls by installation and maintenance men. Straight-thru wiring with vertical overload relays accounts for faster and neater layouts at savings up to 30%, direct routing without crossovers, and immediate circuit identification.

Consult your local distributor or write the factory for engineering service.



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PRINTED IN U. S. A.

COMPACT adjustable-speed control unit replaces old motor-generator set, visible in the background; saving floor space and improving appearance.

Such units gave speed ranges of 3 to 1 or 4 to 1 for continuous operation, and up to 20 to 1 for intermittent operation. Efficiency and power factor are high over most of the speed range. This is a good drive for some conveyors, mixers, bag machines, spinning frames, can machines and printing presses.

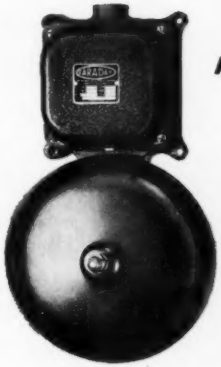
There is also a speed variator available in ratings from 1- to 200-hp., consisting of a motor-generator set providing ac power to an adjustable-speed dc motor. The speed variator is furnished by the factory in a complete package including motor, m-g set and all controls. With it, speed ranges from 8:1 up to 40:1 are obtainable with high efficiencies. It's practical with many semi-automatic control systems.

A third type of speed control is obtained with a thymotrol drive with ratings from 1/20- to 75-hp. This consists of an adjustable-speed dc motor and an electronic rectifier which furnishes the dc power. This drive is unusually versatile, giving high-efficiency speed adjustment over speed ranges of 8:1 up to 100:1. Speed control within plus-or-minus ½ of 1% can be accomplished. Thymotrol also lends itself to almost all types of control systems.

In conclusion, two things should be remembered concerning adjustable-speed drives. First: It permits maximum return from machine investment; results in easy conversion from one type of production to another, and permits the use of less skilled labor in many critical operations. And second: Adjustable-speed drives are available today in packages which include both the proper motor and proper control equipment, resulting in simple installations with a minimum of application engineering.

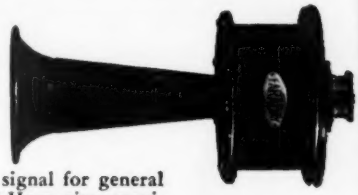
With the other advantages enumerated and discussed in this brief article, the tremendous field for adjustable-speed drives is clearly evident.

...conversion's less of a problem with Faraday heavy duty signals



ATL-700 BELL

Whether it's a quick change series of signal units or merely one heavy duty signal, you're buying Name Brand dependability with Faraday. Different department noise levels are quickly converted with the proper signal to fit the condition. The illustrated ATL-700 Bell is a rugged neck type vibrating bell giving clear tone at maximum sound output. It's weatherproof, connects quickly to exposed conduit or outlet box, comes in 4", 6" and 10" diameters.



121-U HORN

A rugged heavy duty signal for general plant use. The 121-U Horn gives maximum signal strength, loud clear tone, instantaneous performance, and long life under exacting conditions. It easily converts from one department to another using the Uni-pact quick-change mounting system. Model 121-U is one of 17 different bells, buzzers, horns, chimes making up the quick-change Uni-pact series. Write for details.

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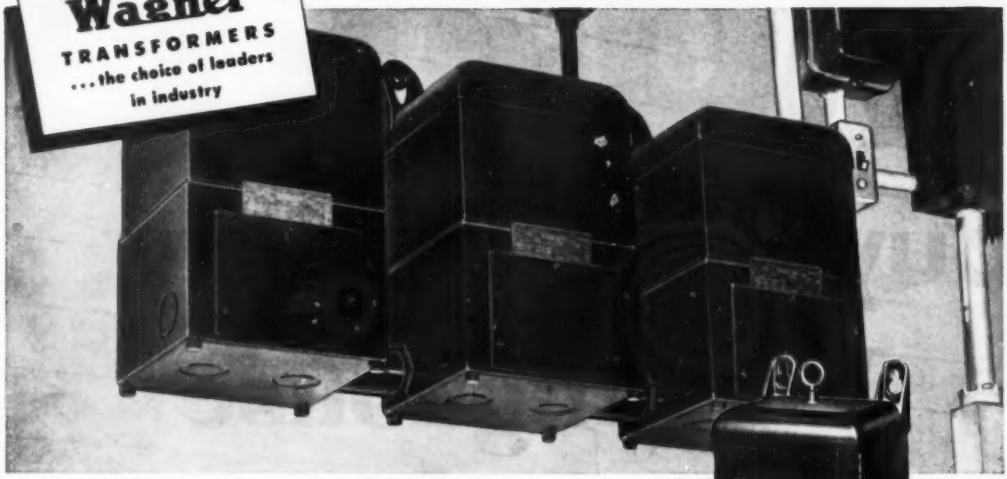

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Wagner Dry-Type Transformers are available in single-phase, two coil units (Type AE) in sizes 1.0 to 200 kva and in three-phase, two coil units (Type AP) in sizes 3.0 to 300 kva. Both types 600 volts and below.

These dry-type transformers can be used in many lighting and power applications. Bulletin TU-90 gives many suggestions that you can use—write for your copy or consult the nearest of Wagner's thirty-one branch offices for expert advice on your transformer problems.

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In The News

Plans For NECA Convention Announced

An Exhibit of Electrical Progress covering the last half century of electrical development in America will be a feature of the Golden Anniversary Convention of the National Electrical Contractors Association at the Shoreham Hotel in Washington, D. C. the week of October 8-12, 1951.

The Exhibit, bringing together an array of the latest developments in electrical products and installation methods in contrast to the crude pioneering beginning of the industry in 1901, will be open to the public as well as providing a fitting backdrop for the big electrical meeting. Practically every important electrical manufacturer in the industry has cooperated in developing the Exhibit, and the electric utility industry has provided important contributions.

The Exhibit is built around the dual theme of "Electrical Progress" over the past 50 years and "Building for Defense", the latter being the theme of the Convention. The central display will be a series of panel booths presenting a half hundred enlarged photographs of the most modern applications of electrical use as installed by electrical contractors throughout the country. These will be actual photographs of all types of electrical construction—industrial, residential, line, commercial, marine, power generation, public buildings, power and lighting. Contrasting with the new will be actual photographs of comparable, if any existed, installations of the 1901 era.

A second part of the Exhibit will be a series of island, walk-around displays presenting table-top presentations of the various types of electrical equipment and material so as to contrast on one display board the very latest and the 1901 varieties. The visitor can expect to see 1901 and 1951 types of conductor, raceways, lamps, motors, wiring devices, circuit protection and other items. There will be special island displays of the latest motors, special electrical apparatus such as door operators, remote control switching, then and now booths on school and home lighting and electrification, and an elaborate installation showing the development of lighting. A special display showing the adequate wiring of a model residence has been created especially for the Exhibit under the direction of Lyle Foster of Peoria, Illinois, NECA member of the National Adequate Wiring Bureau Plan Comimttee. This is a model ranch type house built exactly to scale and with proper electrical installations throughout but in miniature sizes that actually work.

Other exhibits will carry the story of the free enterprise development of the electrical industry.

Other features of the Convention, include a display showing the functioning and services of a service-type trade association serving its small businessmen members, a special Golden Anniversary issue of the NECA magazine, Qualified Contractor, and a specially prepared booklet reciting the 50-year history of the NECA which was written by Laurence W. Davis, secretary-treasurer of the National Electrical Benefit Fund and for more than a quarter of a century general manager of NECA.

The Convention proper commences on Monday evening, October 8, with a Reception in the Shoreham Hotel.

IN A UNITED EFFORT to increase the use and efficient application of electricity in Chicago area industrial, commercial and residential structures are these Chicago Electric Association committee chairmen: (L to R) A. J. McGivern, Chicago Electrical Wholesalers Association (Adequate Wiring); Felix Van Cleef, Van Cleef Brothers, Inc., (member, Board of Directors); John McC. Price, Allen-Bradley Co. (Chicago Electrical Industry Show); H. C. Moses, The Thomas & Betts Co. (Electrical Modernization); and F. R. Eiseman, Jr., Revere Electrical Supply Co. (Electric Construction Materials, Devices and Apparatus). Some 24 other committee chairmeh comprise the inter-related industry group which is pushing the Electric Association five-year promotion program.

IAEI OFFICIALS AT the Illinois Chapter, Western Section's 21st midyear meeting, Midland Country Club, Galva, Illinois, are: (L to R) Mr. and Mrs. Charles L. Smith, Chicago, IAEI secretary; Mrs. T. W. Briegel, Galva, conference hostess; Norman H. Davis, Jr., Chicago, chairman, Illinois Chapter; Otto E. Radtke, Cleveland, president, Western Section, IAEI; T. W. Briegel, Galva, conference host; Carl E. Evans, Danville, vice chairman, Illinois Chapter; W. J. Alcock, Chicago, secretary-treasurer, Illinois Chapter. More than 85 members and guests took part in the two-day agenda of technical papers and discussions.

Yours for the Asking!

KEYSTONE'S NEW "Value-Packed" CATALOG

STILL GROWING!

New expanded plant facilities now assure you of immediate delivery on Keystone's standard wiring installation equipment.

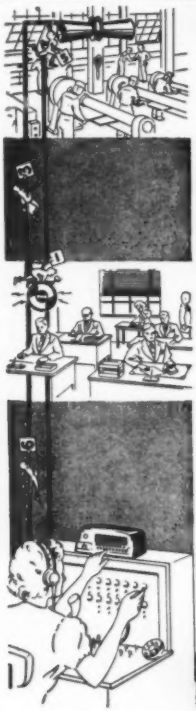
. . . a complete line of FLANGED and FLANGELESS WIREWAYS
AUXILIARY FITTINGS • OUTLET BOXES • BOX COVERS • BAR HANGERS

Here it is! A brand new "value packed" catalog containing complete information and specifications on Keystone's standard line of quality-built wiring installation equipment. Gives you a FREE and easy-to-use listing of time-saving, labor-saving, money-saving items designed to fit quickly and naturally into almost every electrical distribution system. Yes, FREE . . . send for your copy today!

• It pays to "figure on Keystone!"

NOW! Territories open for agents with warehouse facilities. Write for full particulars!

KEYSTONE MANUFACTURING COMPANY
23328 Sherwood Ave. • Centerline (Detroit) Mich.
Sold Through Leading Electrical Wholesalers Coast-to-Coast



NEW Wheelock CODE CALL FOR INSTANT COMMUNICATION

Code call is made by a numerical code, sounding signals.

Promptly completes telephone connections with organization personnel away from their own telephones.

Eliminates time waste of telephone operator and other employees in "man-finding."

Enables employees without telephones to answer nearest telephone.

Write for New Bulletin B4-3

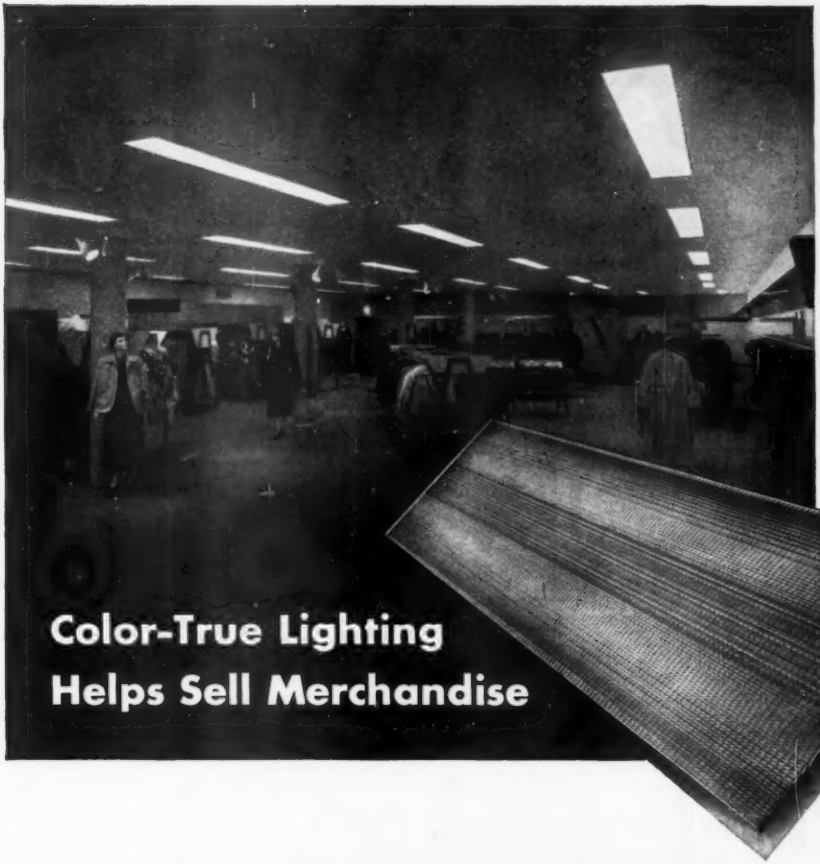
SIGNAL ENGINEERING and MANUFACTURING COMPANY
154 WEST 14th ST. • NEW YORK 11, N. Y.

Members of Congress, officials of the federal government concerned with the construction and electrical industries, industry leaders as well as members will attend this event. Tentative arrangements have been made for the relighting of the remodeled White House at this event.

The business sessions start at 9:30 a.m. on Tuesday, October 9. The first day's sessions include the address of NECA President Erne C. Carlson and an address by Dan W. Tracy, international president of the International Brotherhood of Electrical Workers. The annual luncheon will be held on Wednesday, October 10 and Senator John J. Sparkman, D., Alabama, chairman of the Senate Small Business Committee, will be the principal speaker. His subject will deal with suggestions on assisting the small businessman contractor. Another headline speaker that day will be John Small, chairman of the Munitions Board. Mr. Small will discuss the implications of the huge Department of Defense Construction Program.

Most of the business sessions will be devoted to forum-type and panel discussions of specific contractor problems. At one session eight major industry problems will be presented by as many contractors and the session will be thrown open for floor discussion. Other phases of the program include reports and actions on major committees, including Governmental Affairs, Business Promotion and Research and Education. An election for the office of president of the association will be held during the convention and numerous constitutional amendments will be acted upon.

J. A. SCHEFFER, manager, Greater Kansas City Chapter, NECA, was the pivot man in the successful contractor-motor shop-wholesaler-union cooperative effort to electrically rehabilitate flood-stricken industries.



Architects:
Sanders and Malsin
New York City

Electrical Engineers:
Smith and Silverman
New York City

Electrical Contractor:
Johnson Electric
Corporation
New York City

Fixture Manufacturer:
Ruby-Philite Corporation
Long Island City

Glass:
CORNING
"Light-Weight"
Lens Panels

Color-True Lighting Helps Sell Merchandise

CORNING "LIGHT-WEIGHT" LENS PANELS SELECTED FOR NEW LANE BRYANT STORE

Lighting should help make merchandise look its best *besides* adding decor to the surroundings. That's why CORNING "Light-Weight" Lens Panels were specified for the new Brooklyn unit of Lane Bryant Stores.

Corning's new clear crystal glass assures high lighting efficiency. It transmits the true color of the light source—especially important where fine fabrics are displayed. Back surface fluting cuts down end and side luminaire brightness. Fresnel design lenses distribute light evenly.

CORNING Lens Panels add special beauty to any installation. Single panels available for fixture openings of varying lengths eliminate unsightly joints. This feature streamlines appearance, does away with light leakage, and permits more design flexibility. And these are the lightest weight lenses on the market today—weighing only 1½ lbs. per running foot (11 inches wide). This makes possible lighter, less expensive fixtures and lower shipping costs.

In fact, CORNING Lens Panels cost less all around—less to buy, less to install . . . less to clean. Find out more about CORNING "Light-Weight" Lens Panels and what they can do for you. Write for information today.

PYREX

CORNING GLASS WORKS

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Corning means research in Glass

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Technical Products Division: Laboratory Glassware, Signalware, Glass Pipe, Gauge Glasses, Lightingware, Optical Glass, Glass Components

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Please send your bulletin describing CORNING "Light-Weight" Lens Panels.

Name_____ Title_____

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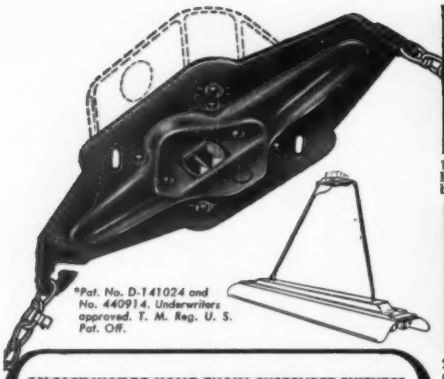


*Pat. No. D-141024 and No. 440914. Underwriters approved. T. M. Reg. U. S. Pat. Off.

AN EASY WAY TO HANG CHAIN-SUSPENDED FIXTURES
IN LESS TIME...AT LESS COST...WITH LESS WORK
WITH

HYDEE HANGER*

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5402 Bulwer Ave., St. Louis 7, Mo.
In Canada: Amalgamated Elec. Corp., Ltd., Toronto 6, Ontario

DISTRIBUTED NATIONALLY BY LEADING ELECTRICAL WHOLESALERS

1. Connect wires to receptacle. Fits standard 4" or 3¼" outlet box or plaster ring.

2. Screw hanger to outlet box—only two screws needed. No centering, punching, or drilling. Screwdriver only tool needed.

3. Hang the fixture and plug it in. That's all! Self-grounding—regular 2-wire cord and plug may be used.

Hydee Hanger: complete with receptacle, two 5-ft. chains, "S" hooks and clips—

01

POWER *for your own* **PIPE THREADING TOOLS!**

POWER VISE STAND

Standard range ⅛" to 2" pipe. Range with Drive Shaft 2½" to 8" pipe.

The Pay-Off

● Time saved by the Oster POWER VISE STAND quickly pays for its low cost. Then comes the real "pay-off." The machine keeps handing you money—in time and labor-saving on every threading job.

Exclusive "Auto-Grip" Chuck! This automatic-gripping front chuck is *standard equipment* on every OSTER POWER VISE STAND. No bars or wrenches needed! Grips any kind of pipe *automatically!*

Write for complete catalog information NOW!

THE OSTER MFG. CO.
2081 East 61st Street • Cleveland 3, Ohio

ICI Sessions Held In Stockholm

The United States was well represented at Session XII of the International Commission on Illumination held in Stockholm Sweden, June 26 to July 7, 1951. Five of the 25 Technical Committee Reports were compiled by U. S. Secretarial Directors, and six of the 43 technical papers were of U. S. origin. Also, the United States National Committee, ICI, had many delegates and representatives of the Illuminating Engineering Society (U. S.) and other professional societies present.

At the opening general session, in the presence of King Gustav VI Adolf, 450 delegates from 22 countries, and 100 guests, a paper by Mr. Ralph Evans, Eastman Kodak Company, Rochester, N. Y., on "Seeing, Light and Color" was presented by Dr. D. B. Judd, U. S. National Bureau of Standards, Washington, D. C.

U. S. Secretarial Directors who compiled and presented Technical Committee Reports were as follows:

D. B. Judd, U. S. National Bureau of Standards, Washington, D. C., "Colorimetry."

R. M. Zabel, Westinghouse Electric Corp., Bloomfield, N. J., "Lighting of Public Highways."

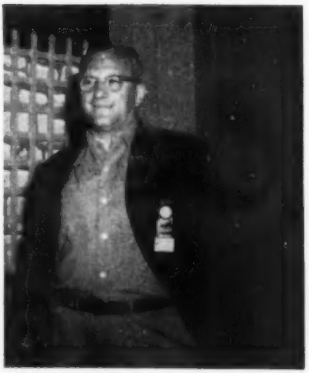
F. C. Breckenridge, U. S. National Bureau of Standards, Washington, D. C., Colors of Light Signals."

Willard C. Brown, General Electric Co., Nela Park, Cleveland, Ohio, "Lighting Practice."

H. A. Kliegl, Kliegl Bros., New York, "Television."

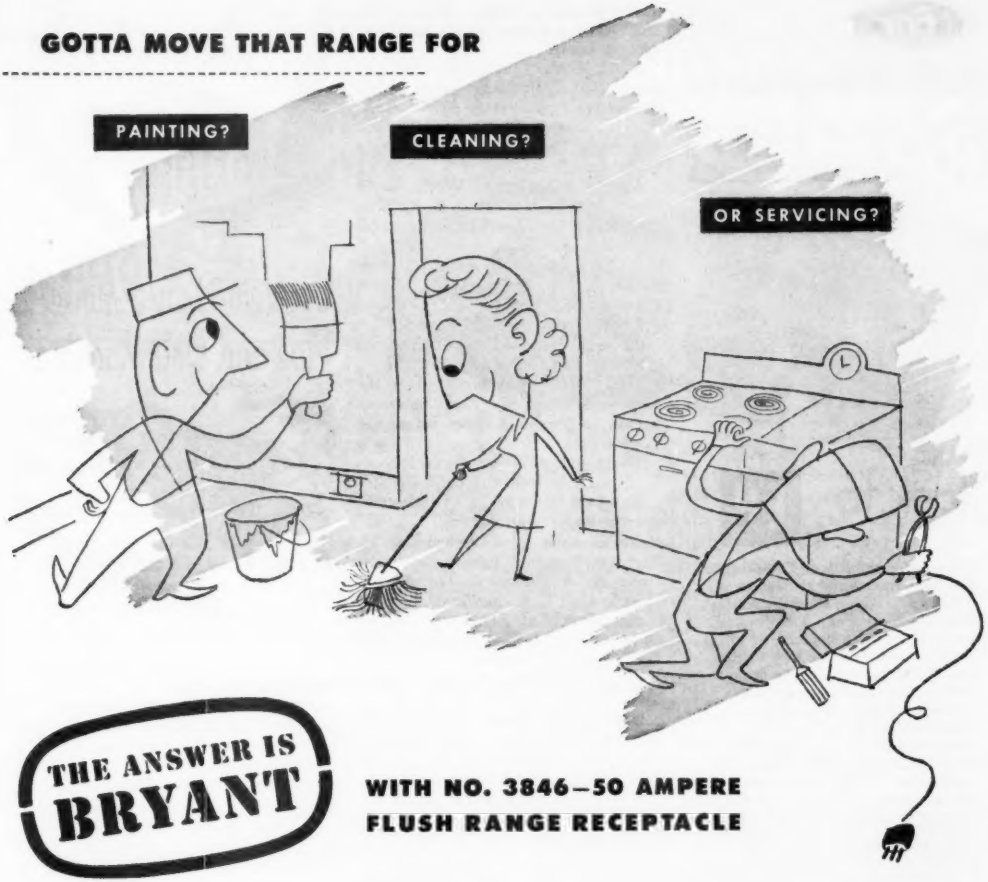
U. S. Representatives who presented papers and subject of papers were as follows:

D. F. Lowry, Sylvania Electric



RAY J. KNOBLOCK of Syracuse was elected president of the New York State Electrical Contractors and Dealers Association at the annual convention held at Saranac Inn.

GOTTA MOVE THAT RANGE FOR



THE ANSWER IS BRYANT

WITH NO. 3846—50 AMPERE FLUSH RANGE RECEPTACLE

For fast, convenient installation . . . for painting or redecorating . . . for servicing or moving of electric ranges, the answer is the Bryant 3846 3-wire polarized range outlet.

This heavy duty device has a sturdy bakelite receptacle for long, dependable service. It's easily installed . . . has solderless terminals to accommodate No. 8 or No. 6 conductors.

Along with the 3846, specify the Bryant line of Range Cord Sets, including 35 and 50 Ampere with Non-Removable Bakelite Caps . . . and 35 and 50 Ampere all-rubber molded sets.

Specify Bryant Devices from Your Electrical Distributor.

NO. 3846
FLUSH RANGE RECEPTACLE
with .040" Brush Brass Plate

THE BRYANT ELECTRIC COMPANY

Bridgeport 2, Connecticut

Chicago • Los Angeles

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BRYANT
SUPERIOR WIRING DEVICES

J-99859

for
custom-engineered
POWER

look to... EP

Since 1909, the job of The Electric Products Company has been to create and develop special electrical rotating equipment . . . motors and generators to do existing jobs better or to reach into new fields to do jobs that couldn't be done before. The natural "by-product" of our more than 40 years of specialization is that you get equipment designed and built to the exact requirements of your application . . . equipment that has greater dependability, longer life and that requires less maintenance.

Send in the coupon below for detailed information about our Custom-Engineered synchronous motors and generators . . . d-c motors and generators . . . induction motors . . . battery chargers . . . frequency changers.

A nation-wide sales engineering and service organization stands ready to meet all User requirements.

THE ELECTRIC
PRODUCTS COMPANY

1734 CLARKSTONE ROAD
CLEVELAND 12, OHIO

Attach coupon to your letterhead for your copy of Bulletin 3-200

NAME_____
TITLE_____
COMPANY_____
STREET_____
CITY_____ ZONE____ STATE_____
X-74

Products, Inc., Salem, Mass., "The Engineering Evolution of the Fluorescent Lamp."

S. K. Guth, General Electric Co., Nela Park, Cleveland, Ohio, "The Subjective Appraisal of Brightness."

R. L. Biesele, Southern Methodist University, Dallas, Texas, "Daylight in Classrooms."

Myrtle Fahsbender, Westinghouse Electric Corp., Bloomfield, N. J., "Two Decades of Residential Lighting in the United States."

R. G. Slauer, Sylvania Electric Products, Inc., Salem, Mass., "Space Concepts of Lighting."

C. M. Cutler, General Electric Co., Nela Park, Cleveland, Ohio, "Creating a Selling Environment with Light."

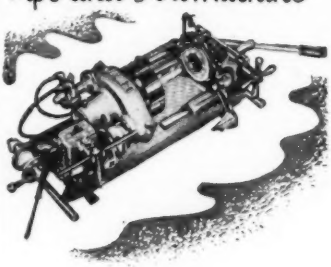
Miss Myrtle Fahsbender had the honor of being the first American woman to present a paper before the Commission.

Those in attendance at the Stockholm Sessions from the United States included the following: C. A. Atherton, Westinghouse International; I. A. Balinkin, Univ. of Cincinnati; L. E. Barbrow, National Bureau of Standards; A. A. Brainerd, Philadelphia Electric Co.; F. C. Breckenridge, National Bureau of Standards; W. C. Brown, General Electric Co.; C. M. Cutler, General Electric Co.; H. Deming, International General Electric Co.; Myrtle Fahsbender, Westinghouse Electric Corp.; S. K. Guth, General Electric Co.; Ward Harrison, Consulting Engineer; S. G. Hibben, Westinghouse Electric Corp.; D. B. Judd, National Bureau of Standards; R. A. Manwaring, Philadelphia Elec. & Mfg. Co.; R. C. Putman, Case Institute of Technology; F. J. Vorlander, Champion Lamp Works; W. C. Wag-

ELECTRICAL ENGINEER A. E. Hopkins (center), City of Chicago, poses some interesting questions on underfloor duct installation. Supplying the answers are Earl Nelson (left) and L. W. Block of National Electrical Products Corporation, Chicago.

• LIGHTWEIGHT
• LOW-PRICED
• EASY-TO-MOVE

the New Beaver Model-E
Pipe and Bolt Machine



The new low-priced, lightweight Beaver Model "E" is a "junior edition" of the heavy-duty Beaver Model A—which has, for the past 20 years, been the recognized leader in the field of portable pipe and bolt machines.

The Model "E" uses the same dieheads—the same dies—the same patented interchangeable wheel-and-roller or knife cutoff devices—the same reamer arm and cone—as the Models A and B. This will be a great advantage to thousands of shops now equipped with the Beaver Model A or B because it eliminates the necessity of carrying in stock duplicate dies and parts—thereby preventing endless confusion and needless expense. And remember, there are 195 different kinds and sizes of dies instantly available for Models A, B or E.

Although designed primarily for hardware stores and small piping contractors, BIG contractors will find the new Model "E" useful on jobs requiring extreme portability.

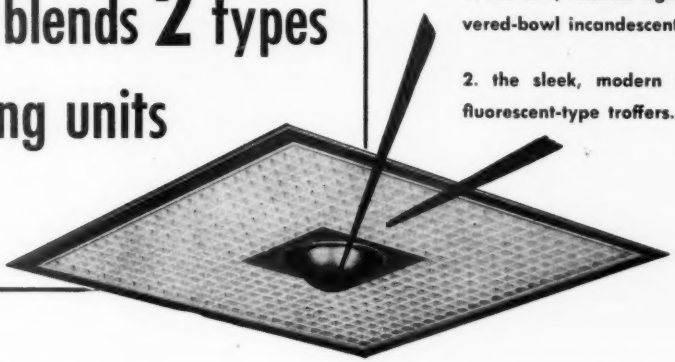
A pipe machine is no better than the service back of it and our 50 years of experience in this field, and our reputation for high quality and friendly service, is your best guarantee of complete satisfaction.

PRICE: $385.00 with quick-opening die head and ½ to 2" dies.
STAND (with 14" wheels) $20.00.

Write for special bulletin on new Beaver Model "E" lightweight economy model.

BEAVER
PIPE TOOLS
232-300 DANA AVE. WARREN OHIO USA.

Skylike® blends 2 types of lighting units into 1



1. the soft, indirect light of silvered-bowl incandescent lamps.

2. the sleek, modern look of fluorescent-type troffers.

Silvray's SKYLIKE lighting system offers your commercial customers many advantages not found in any other lighting system, yet uses only silvered-bowl incandescent lamps.

Designed along modular concepts for recessed or semi-recessed use, SKYLIKE fixtures may also be surface-mounted in old or remodeled interiors without sacrifice in lighting quality.

Silvray SKYLIKE units are amazingly economical in initial cost — only ½ to ⅓ as much as other equipment delivering comparable results. Fixtures fit 24" x 24" ceiling tile . . . are light in weight for quick installation. Simplicity in wiring and construction eliminates costly service call-backs. In addition, your customers take advantage of continued maintenance savings, for SKYLIKE units can be relamped from the floor and require only an occasional cleaning with a damp cloth.

Here's *real* proof of SKYLIKE efficiency

These unretouched photographs demonstrate the versatility of the SKYLIKE louvered incandescent lighting system.

In each case, the only light source used was that of the SKYLIKE units — note the soft, even distribution of light . . . the complete absence of glare, harsh shadows, and sharp light cut-off lines.

Photo by Milton Mann Studios

A unique SKYLIKE application is pictured here in the showroom of Irving A. Belking Furs in San Francisco, California.

Notice how architect Bernard J. Saboroff's gridwork of 1 x 6 pine serves to hide the unsightly high ceiling, as well as to support the patterned group of recessed Silvray SKYLIKE units. Low brightness levels and 90° shielding provide an extremely satisfactory result.

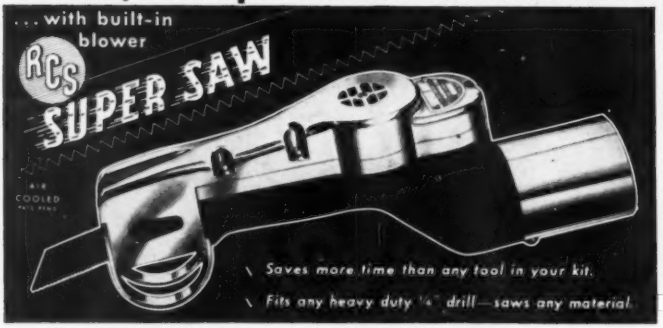
Selected for warm color and ease of installation, surface-mounted SKYLIKE units replaced out-moded globe-type units in the remodernization of the Levy Brothers Store in Elizabeth, N. J.

Variable lamp sizes — from 150 to 500 watts — permit day-to-day changes in lighting intensities. Units can also be converted for accent or directional lighting by use of a semi-silvered lamp and accessory.

Send for complete SKYLIKE information. A comprehensive booklet describing the SKYLIKE system is yours for the asking. To get your copy, write Graybar Electric Company, Inc., Graybar Building, 420 Lexington Avenue, New York 17, New York.

SILVRAY LIGHTING INC.

A Journeyman's Tool, built to stand up under constant, on-the-job Contractor or Industrial use


...with built-in blower
RCS
SUPER SAW
AIR COOLED
Saves more time than any tool in your kit.
Fits any heavy duty ¼" drill—saws any material.

● **NO STARTING HOLE NEEDED**...Simply place guide next to material and "rock" tool into an upright position.

● **CUTS RIGHT THRU IMBEDDED NAILS** . . . wood, plaster, iron pipe, sheet metal, "Transite" and most other materials—even in cramped quarters.

● **FITS ANY HEAVY DUTY ¼" or ⅜" DRILL**...as easy as changing bits! Overall length only 10¾"; weight only 3 lbs. 6 ozs.

● **ANTI-FRICTION REPLACEABLE BEARINGS—BUILT-IN BLOWER** . . . Blower keeps tool comfortably cool even under continuous use—blows dust and chips away from cutting line. All friction surfaces are of "Oilite," phosphor bronze or high speed ball bearings. All wearing parts are replaceable.

Write for Bulletin No. Y-9

Cutting opening in oak flooring in less than 3 minutes—no starting hole needed!

R.C.S. TOOL SALES CORPORATION Joliet, Illinois, U. S. A.

Federal Procurement Officials will find Super Saws listed in Federal Supply Schedules, Class 40 Materials.

The Heavy-Duty "Badger"... A BETTER-BUILT Switch

• All time switches are *not* alike. In the Reliance "Badger", arcing between contacts is eliminated, and objectionable sound level is reduced to a minimum. Extra heavy gears, a slow-speed synchronous motor, and heavy copper-to-copper, self-adjusting "floating" contacts—all help to make the Reliance "Badger", a better-built switch for long-lasting, accurate control. For complete information, write—RELIANCE AUTOMATIC LIGHTING CO., 1937 Mead Street, Racine, Wisconsin.

RELIANCE TIME SWITCHES

CONSULTING ENGINEERS Ralph H. Decker, Sr. and Jr. (center) get the complete story on Appleton's new V-51 series of vapor-proof lighting units from E. A. Hakanson (left) and Louis Fair at recent Chicago Industrial Electrical Show.

ner, Philadelphia Electric Co.; and T. D. Wakefield, Wakefield Brass Co.

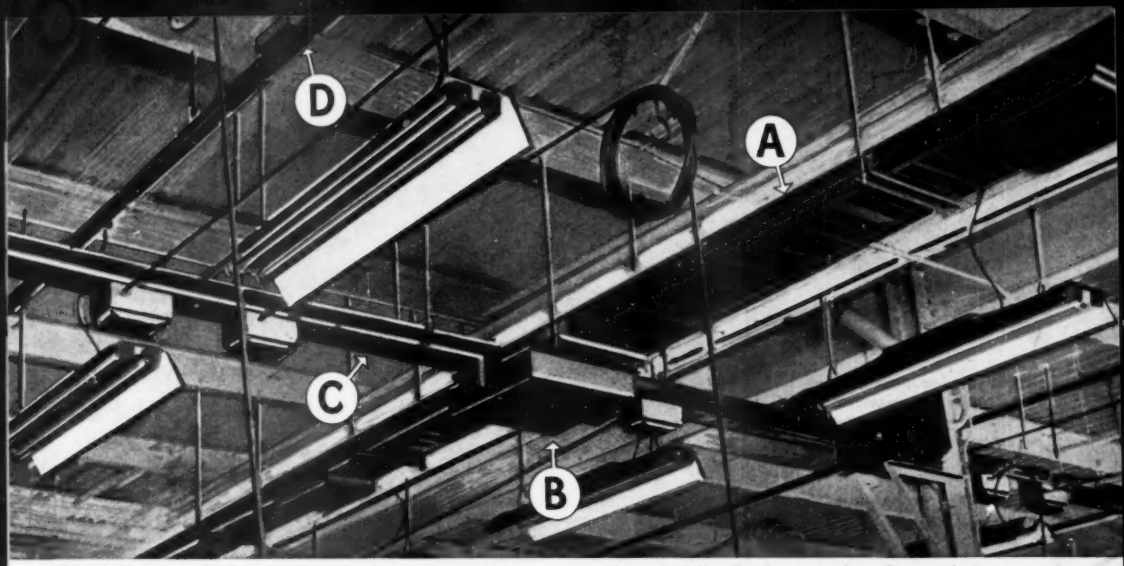
Dr. Ward Harrison of the United States, formerly Director of Engineering for the General Electric Company Lamp Department at Nela Park, Cleveland was elected President of the Commission (ICI) for the four year period ending in 1955, when Session XIII will he held in Switzerland. Other officers elected were: N. A. Halbertsma (Netherlands), Hon. President; J. W. T. Walsh (Great Britain), Vice President; M. Leblanc (France), Vice President; I. Folcker (Sweden), Vice President; H. Konig (Switzerland), Hon. Treasurer; and C. A. Atherton (Westinghouse Electric International, New York, United States), Hon. Secretary.

New Merit Award Rules For Lighting Exposition

New official rules for the $2500 Merit Award Competition, sponsored by the Fourth International Lighting Exposition and Conference, have been released. In addition to continuing many of the regulations of the last popular competition, several new rules have been added and should prove of special interest.

Requirements for entering have been further simplified and standardized; the total number of Gold Seal Merit Awards has been increased to five in each classification and the cash value of Gold Seal Merit Award prizes has been increased to $2500; and the nature of the material expected from entrants is more specifically defined and provisions are made for even greater recognition and publicity for winning awards.

"For two very important reasons,



MAIN FEEDER AT SEALED POWER CORP. Trumbull LVD FLEX-A-POWER high-capacity feeder (A) distributes power through plant with minimum voltage loss. Can be dismantled, relocated with complete salvability. Tap box (B) takes off power for FVK secondary feeders (C). 600-4000 amperes. LTG (D)—see below—is used for lighting. Bulletin TEB-1.

SECTIONALIZED POWER FEED

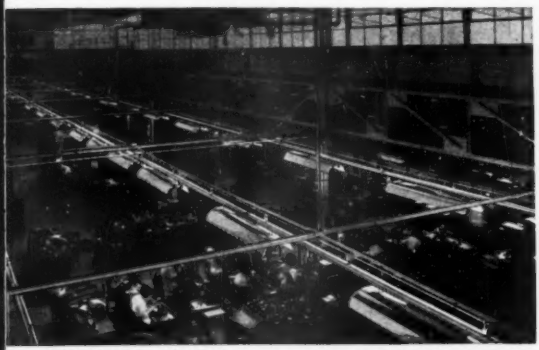
is ready for quick conversion

It is doubtful if any one of your customers can foretell what his power requirements will be months—or days—ahead.

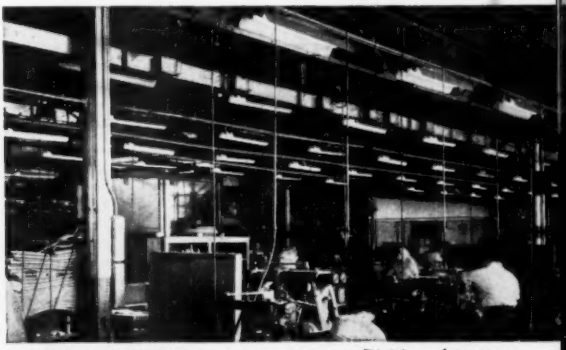
But if you sell him Trumbull FLEX-A-POWER® to handle the power distribution from main switch or breaker to machine or lamp . . . he can easily meet any new requirement for additional loads or rearrangement of loads.

This system of standard-section busways gives utmost flexibility in power take-off, and, if necessary, can be taken apart for quick relocation. Easier to install than wiring and conduit, it is ideal for a period when emergencies may develop any day, when complete conversion may be necessary.

We have literature for distributor use.



LIGHT-DUTY BUSWAY AT PESCO PRODUCTS Division of BORG-WARNER CORP. Use of LTG FLEX-A-POWER to distribute power to tools and lighting fixtures permits quick changes in machine layout without delay for rewiring. Busway can be tapped *at any point* by plug or trolley—every inch an outlet. Rated 50 amperes. Bulletin TEB-2.



SECONDARY FEEDER AT PESCO PRODUCTS Division of BORG-WARNER CORP. Nearly ¾-mile of 600 amperes, 440 volt Trumbull FVK FLEX-A-POWER takes power from a panelboard in parallel runs over entire area. 15 outlets to each 10-ft. section. No expensive rewiring needed when relocating loads. Can also be easily dismantled and re-installed. 225-1000 amperes. Bulletin TEB-4.

TRUMBULL (T) ELECTRIC

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY, Plainville, Conn.

G&W

POTHEADS

The Industry Standard for Cable Terminations

Single and multiple conductor potheads in fourteen standard shapes meet all installation conditions.

CAPNUT TERMINAL

Completely sealed terminations for indoor and outdoor use.

Interchangeable aerial lugs and base fittings.

DISCONNECTING

Hermetically sealed cable termination with convenient plug and socket disconnect for isolating or interconnecting circuits.

STRAIGHT THROUGH

Cable end seals for indoor use.

All G & W Potheads use new universal "Resistoyl" rubber bushing entrance seal for leaded or non-leaded cables.

WRITE FOR BULLETIN AB51
Complete Pothead Listings.

G&W ELECTRIC SPECIALTY CO.
7710 Davis Ave., Chicago 19, Ill., U.S.A.
Representatives in Principal Cities
In Canada, Powerlite Devices, Ltd., Toronto

CHICAGO EME officers for 1951 term are: (L to R) vice president—L. D. Cook, Commonwealth Edison Co.; president—E. J. Fitzgerald, E. I. DuPont de Nemeurs & Co.; secretary-treasurer—Virgil Otto, Electric Association. Officers were elected at recent meeting of the Electrical Maintenance Engineers' executive committee.

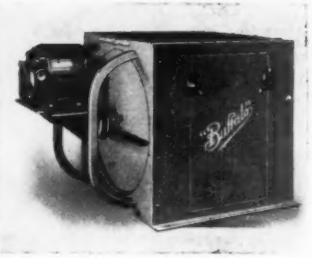
interest in the new 1952 Merit Award Competition is greater than ever before," says G. T. Morrow, Chairman of the Merit Award Committee. "First, because the previous I.L.E. Merit Award Competitions have established these awards as a mark of distinction and outstanding achievement, they have become the most coveted and highest honor bestowed in the lighting industry.

"Secondly, because of the increasing importance of lighting today to the Nation's defense effort, entrants in the competition have the opportunity to make a definite contribution to the Nation's welfare. By their submittal of outstanding lighting installations utilizing the most advanced lighting systems, techniques, equipment and other component parts of good lighting, they help to mobilize lighting knowledge to further defense production and to advance America's Welfare."

There are five separate competitions, one for each of the following groups:

1. Electrical Contractors
2. Utility Lighting and Power Representatives
3. Electrical Distributors' Lighting Specialists and Salesmen
4. Architects and Consulting Engineers
5. Owners and Users of Industrial and Commerial Lighting

Judging will be intra-group—that is, a submittal by an electrical contractor will compete with only those of other electrical contractors, etc., and awards will be decided accordingly. In addition, where the installation is the cooperative work of two or more people of the above classifications, the entry may be submitted by the two or more involved as a joint entry and entered

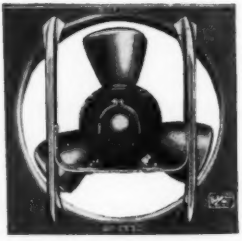


"Buffalo" L Breezo—Enclosed "Package" Exhaust Unit

TOPS in SALES

because they're

TOPS in PERFORMANCE



"Buffalo" Panel Breezo Fan

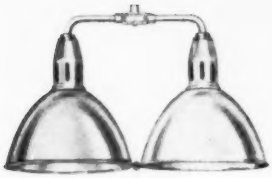
"Buffalo" DISK FANS

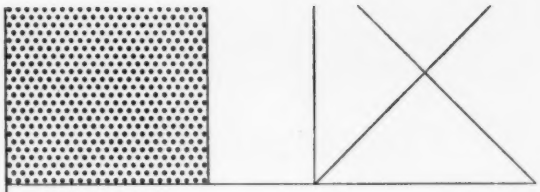
• "BUFFALO" L BREEZO FANS are efficient, easily installed "package" units ideally suited to exhausting vapors, fumes and gases. Motor is completely removed from air stream. Note handy access door. Blades, motor brackets and arms are rugged die-stamped metal. 12" to 36" sizes, up to 7300 cfm at ¼" static pressure. This fan unit is in real demand. Write for complete details.

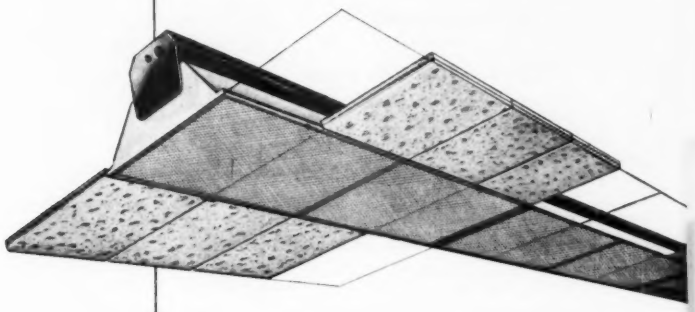
• "BUFFALO" PANEL BREEZO FANS are some of the most popular fans we make—low in first cost, yet of good heavy, rigid die-stamped blades, panels and welded-on motor bracket arms. 6 sizes, 8" to 24", all with high-grade, standard-make motors. Square panel means easy installation. WRITE FOR BULLETIN 3222-F and prices on these fast-moving fans.

BUFFALO FORGE COMPANY
520 Broadway Buffalo, New York
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.
Branch offices in All Principal Cities

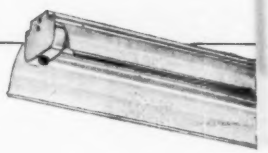
"Buffalo" FIRST FOR FANS







WHY MILLER RATES YOUR CONSIDERATION WHEN YOU ARE PLANNING LIGHTING



Because of experience — 107 years' pioneering and progress in GOOD Lighting. *Because of all-inclusive equipment* for the best use of all light-sources — Fluorescent, Incandescent and Mercury-vapor. *Because of wide acceptance* — America is dotted with Miller lighting installations in stores, offices, schools, factories, and public buildings.

Miller Lighting Systems are built on an 8-Point QUALITY standard, designed to provide light of highest efficiency, and to give long satisfactory service. Engineering features make for easy installation and maintenance, and these make for LOW OVERALL COST (cost of equipment, installation and maintenance). You can light with confidence the *proven* Miller way. Miller field engineers and distributors are conveniently located for nation-wide service.

THE miller COMPANY MERIDEN, CONN.
SINCE 1844

ILLUMINATING DIVISION: Fluorescent, Incandescent, Mercury Lighting Equipment
HEATING PRODUCTS DIVISION: Domestic Oil Burners and Liquid Fuel Devices
ROLLING MILL DIVISION: Phosphor Bronze and Brass in Sheets, Strips and Rolls

magno-tronic

DUAL SILVER POINT — FULLY AUTOMATIC

FLUORESCENT STARTERS

—completely eliminate annoying blinking and flickering of dead fluorescent lamps!

GUARANTEED — FOR ONE YEAR!

This is a glow switch condenserless precision starter equipped with automatic thermal relay circuit breaker. The relay automatically removes the lamp from the circuit electrically when the lamp becomes de-activated and automatically resets upon interruption of the lamp circuit.

SIMPLIFIES — Replacement of defective lamp automatically recycles starter circuit. No buttons to push — no replacement of starter.

REDUCES COST — Magno-Tronic starters provided exact timing of electrode heating, preventing excessive loss of emission material, thus assuring maximum possible lamp life.

VERSATILE — Built to operate efficiently over an extended voltage and temperature range.

Demonstration and Literature on Request.

SP-15-20 For use with 15 or 20 watt lamps.

SP-30-40 For use with 30 or 40 watt lamps.

SP-85-100 For use with 100 watt lamps.

Manufactured under U. S. PATENTS

2298236 2159837 2339307
2334935 2239244 2333694
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Other Patents Pending

INDUSTRIAL ELECTRONICS CORP.
General Offices & Main Plant, 80 BANK STREET, NEWARK 2, N. J.

For QUICK, EASY, SAFE Cable Installation "EFFICIENCY" NESTED CONDUCTOR RACKS

Efficiency Nested Conductor Racks are simple, compact and are scientifically designed to carry conductors equidistant from center to center. One bolt supports the bushing and clamps the bushing support to the frame. Available in 2-3-4-5 and 6 bushing racks.

Write for Catalog 38-A

Efficiency ELECTRIC AND MANUFACTURING CO.

MANUFACTURERS OF EFFICIENCY ELECTRICAL DEVICES FOR CONDUIT, WIRE AND CABLE SUSPENSION

EAST PALESTINE, OHIO

"EFFICIENCY" DEVICES FOR CONDUIT and CABLE SUSPENSION

W. D. STEELE, president, Benjamin Electric Manufacturing Company receives bronze plaque from his son H. P. Steele (right), executive vice president, at recent 50th Anniversary ceremonies in Des Plaines, Illinois. Award honored Mr. Steele as co-founder of the company and commemorated his 50 years of service with the firm.

in one or more of the applicable classifications.

From the entries received, the Board of Judges will select those which, in the opinion of the judges, are entitled to receive Merit Award Certificates. The number of Merit Award Certificates to be awarded will be entirely in the hands of the judges and will be based on the number of entries regarded by the judges as deserving of such recognition. The judges may, at their discretion, award a Merit Award with Distinction Certificate to those entries which, in the opinion of the judges, are deserving of special recognition.

From the entries selected as deserving of Merit Award Certificates or Merit Award with Distinction Certificates, the judges will select those which in their opinion are deserving of Gold Seal Merit Awards in any one of five classes of installations, as follows:

Not more than five Industrial lighting installations may receive a cash award of $100.00 each.

Not more than five School lighting installations may receive a cash award of $100.00 each.

Not more than five Office lighting installations may receive a cash award of $100.00 each.

Not more than five Store lighting installations may receive a cash award of $100.00 each.

Not more than five Miscellaneous lighting installations including street, airport, floodlighting, recreational lighting, protective

Designed for Contractors by Wakefield

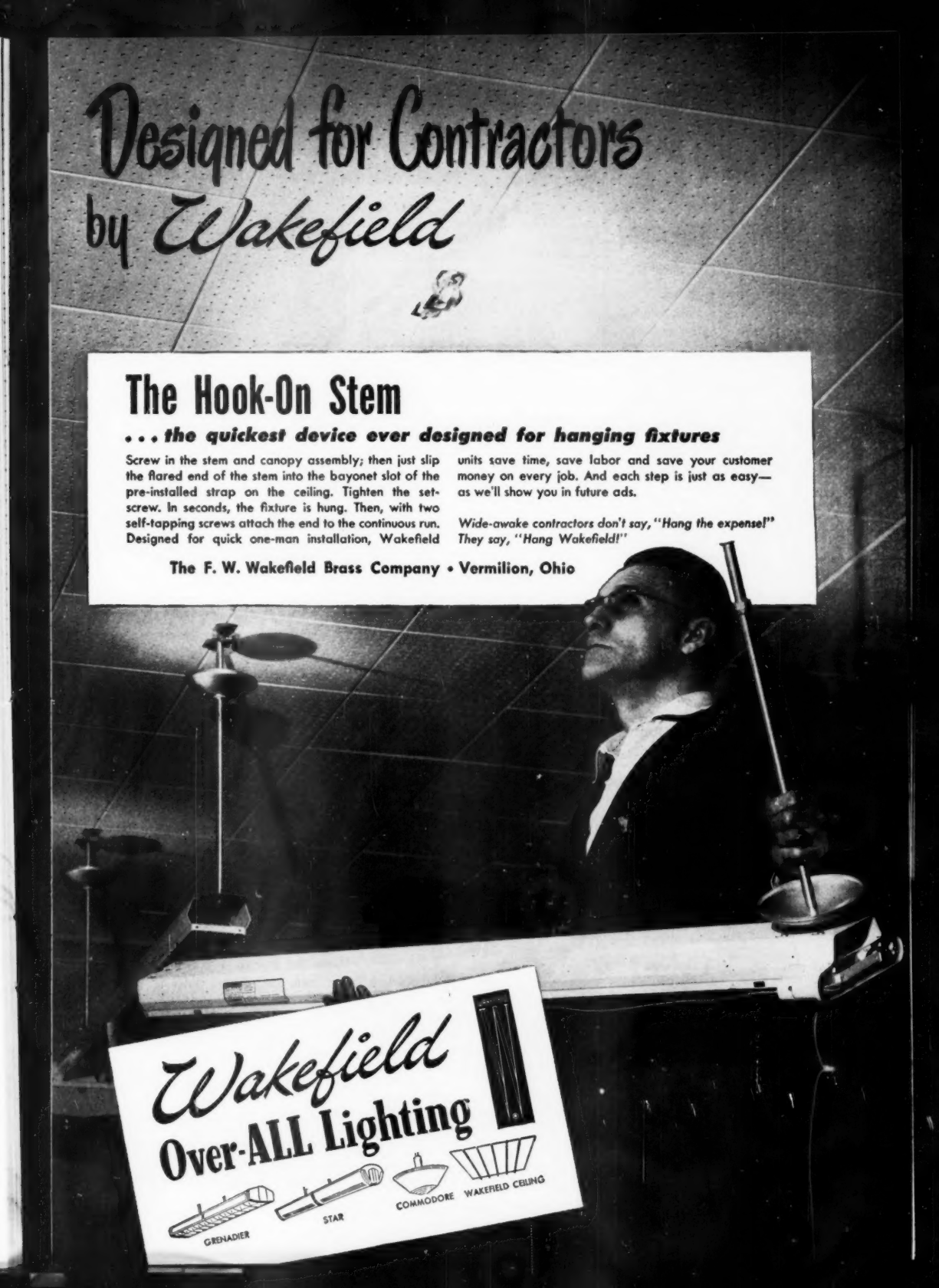
The Hook-On Stem

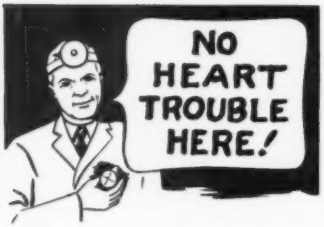
. . . the quickest device ever designed for hanging fixtures

Screw in the stem and canopy assembly; then just slip the flared end of the stem into the bayonet slot of the pre-installed strap on the ceiling. Tighten the set-screw. In seconds, the fixture is hung. Then, with two self-tapping screws attach the end to the continuous run. Designed for quick one-man installation, Wakefield units save time, save labor and save your customer money on every job. And each step is just as easy—as we'll show you in future ads.

Wide-awake contractors don't say, "Hang the expense!" They say, "Hang Wakefield!"

The F. W. Wakefield Brass Company • Vermilion, Ohio





As a buyer of time switches . . . and a user, you are well aware that a time switch can be only as good as its motor.

INTER-MATIC Time Switches are now powered by the *new* International Timing motor developed and patented by International Register Co. The motor is the result of many years of research and testing. It is a self-starting, synchronous type motor.

- **Slow Speed**—450 R.P.M., one-eighth the speed at which most other time switch motors operate.
- **High Torque**—Plenty of power . . . 20 ounce-inches at 125 V.
- **Quiet Operation**—The first high speed reduction gear is made from tough, resilient nylon for quiet running.
- **Sealed-In-Lubrication**—requires no further lubricant during the life of the motor.

ONLY INTER-MATIC TIME SWITCHES ARE EQUIPPED WITH THIS FINE MOTOR!

Write TODAY for FREE Catalog.

INTERNATIONAL REGISTER CO.
2624 W. Washington Blvd.
Dept. 91-B Chicago 12, Ill.

INTER-MATIC TIME SWITCH

lighting, etc., may receive a cash award of $100.00 each.

While the competition does not close until midnight, January 31, 1952, entrants are urged to send in at once the entry blank which appears on the back of the Rules Booklet. They will then be sent a registration number to affix to their entry. The names of the participants will thus be unknown to the five impartial judges, assuring absolute fairness in the selection of the winners.

The judges are Carl Zersen, Chairman, Managing Director, Chicago Lighting Institute; Berlon C. Cooper, Eastern Editor, *Electrical Construction and Maintenance;* John O. Kraehenbuehl, Professor of Electrical Engineering and Illumination, University of Illinois; Burr J. Martin, Publisher and Editor, *Electrified Industry;* and J. Francis McCabe, Superintendent of Buildings, The Art Institute of Chicago.

Awards will be conferred at one of the conference sessions—date to be announced later. Successful entries will be exhibited at the Fourth International Lighting Exposition and Conference, Cleveland Auditorium, Cleveland, Ohio, May 6 to 9, 1952.

Requests for the Official Rules and Entry Blanks should be sent to the Merit Award Committee, 4th International Lighting Exposition and Conference, Room 818, 326 W. Madison St., Chicago 6, Illinois.

New Light and Vision Institute

The Holophane Co., Inc., manufacturers of prismatic light control devices, recently opened its new light

CONTRACTOR INTEREST in new mineral insulated wire is shown by Robert Pierce and J. N. Pierce, Pierce Electric Co., Chicago; Harry Keeley, Kelso-Burnett Electric Co., Chicago; and others at recent Chicago Industrial Electrical Show. Presenting first demonstration in Chicago area is J. B. Clapp (left), sales manager, safety mineral insulated wire division, General Cable Corporation.

SYNTRON
ELECTRIC HAMMERS

They'll save time and money on job after job—drilling anchor bolt holes in concrete and masonry, channelling and cutting holes through walls and floors for pipe and conduit, scaling rust and old paint.

There's no cams or gears—just 3600 powerful blows per minute of one working part—THE PISTON!

Operate from 110 volt or 220 volt A.C.

Write for literature

SYNTRON COMPANY
800 Lexington Homer City, Pa.

No Other Alarm System Has ALL The Advantages Of

R&S UNILARM*...

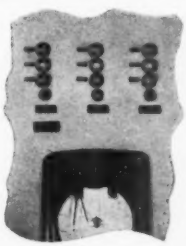
1. Provides unfailing supervision of equipment and process operations.
2. Precision-built to Underwriters' Laboratories requirements. Completely wired and tested . . . ready for field connections.
3. Plug-In Panel (large illustration), fits interchangeably into Explosion-Proof, Vaportight and General Purpose enclosed units. Reduces maintenance to a minimum . . . easily and quickly replaced with a spare unit.
4. Your choice of 100 standard circuits to suit every conceivable application.
5. Distinctive visual signal for each condition (flashing light) insures immediate attention.
6. Any number of Unilarms may be connected to one audible signal.
7. Tried and tested in the field. Thousands in use giving trouble-free protection. Accepted as standard by leading industries.
8. Available as individual unit or in multi-unit Panels. Also time delay types for applications subject to high surge or excessive vibration.
9. Saves space, engineering costs, installation and maintenance over other alarm systems.
10. Acknowledgement-test switch permits periodic testing of each Unilarm circuit.

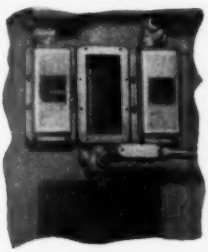
Complete details on request. Write to Dept. U-51.

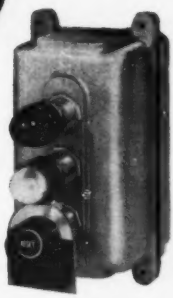
*Reg. U.S. Patent Office.

D1

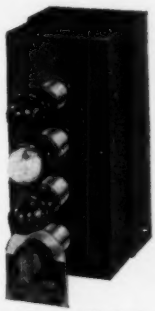
Special Explosion-Proof Unilarm Panel showing stock units, group mounted. Panel is factory wired, sealed and tested.







Vaportight Unilarm



General Purpose Unilarm

R&S Unilarm is also available in a complete line of Surface Mounted Types — Explosion-Proof, Vaportight and General Purpose.

RUSSELL & STOLL

RUSSELL & STOLL COMPANY, INC. • 125 BARCLAY STREET, NEW YORK 7, N. Y.

PRECISION-BUILT ELECTRICAL EQUIPMENT—SINCE 1902

peak efficiency

Standard

TRADE MARK

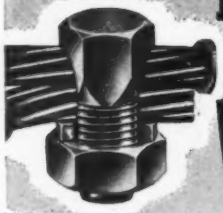
Platform- or wall-mounted air-cooled transformer. 50 KVA, three-phase, 480 to 120/208 Y volts.

FOR YOUR LIGHTING AND POWER EQUIPMENT WITH STANDARD DRY TYPE TRANSFORMERS

Standard's dry type load center transformers assure correct voltages at point-of-use. Installations are easily made and can be quickly relocated to conform to changing departmental requirements. Consult your Standard representative today. He can show you how Standard transformers save you money by assuring top performance from your equipment.

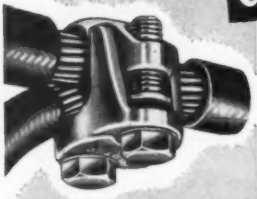
THE STANDARD TRANSFORMER COMPANY
WARREN, OHIO • OFFICES IN PRINCIPAL CITIES

For Dependable, High-Pressure Connections



BLACKBURN *Hi-Strength* CONNECTORS

UL



High-pressure connections are the best electrical connections. They are also the best mechanical connections because tests show that they have better ability to stay tight—are trouble-free once installed.

All connectors in the famous BLACKBURN Hi-Strength Line produce high pressure connections. Also, they are priced right to give you low cost connections that you can depend upon... Be sure to specify BLACKBURN!

SEND FOR CATALOG

JASPER BLACKBURN CORPORATION
35 Madison St. • St. Louis 6, Mo. • CEntral 3007

and Vision Institute as a part of its newly enlarged quarters at 342 Madison Avenue, New York City.

This new Institute, reported to be the only one of its kind, is designed to show visually the fundamentals of lighting, with special emphasis on prismatic control of light. Forming an integral part of Holophane's research program, the Institute is an unusual lecture hall and impressive demonstration room.

Dominating one entire wall is a giant light control board, divided into a series of compartments. In these compartments, specific examples of redirecting light through prismatic control, as incorporated in the company's 118 refractor units and 80 lenses, can be shown and demonstrated simply and clearly.

Other features included in the Institute are transparencies which border three walls of the room reproducing outstanding lighting installations covering a wide range of lighting applications using prismatic light control. Also on display are many of the Company's products. And of special importance are examples of their most advanced research in lighting application which are built into the room display, including 1) surgery lighting built into the ceiling to provide 3000 footcandles at the point of operation, to facilitate televising of operations, 2) a new conception of vertical surface lighting using a new Controlens with concave cross-section which produces twice the light output of any previously known device, and 3) the fundamentals of illumineering (the engineering use of color—how much light to use, and how to obtain visual comfort).

The Holophane Light and Vision Institute is available, according to Holophane officials, to interested groups such as architects and engineers, electrical contractors, electrical distributors, optical and lighting societies, industrial safety groups, architectural and engineering students, and others, for inspection and lectures. Those interested are invited to make arrangements with the Holophane Company for visits and demonstration.

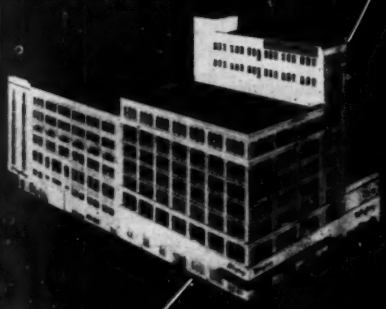
Hills Elected President of Crouse-Hinds Co.

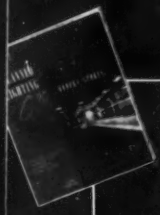
Albert F. Hills was elected president of the Crouse-Hinds Company at a recent meeting of the Board of Directors. Mr. Hills was formerly executive vice president. He has been with the company for 50 years and during that time has served as purchasing agent, secreary and vice president, di-

a LIGHT job* well done

WITH PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT

OUTSTANDING! This one word completely describes the illuminating results so easily and successfully achieved at famous Wurzburg, the heart of Grand Rapids. Pittsburgh Permaflector Equipment enabled Wurzburg to plan with imagination and light for their needs. Top performance with "custom designed" appearance was assured. Fluorescent and incandescent units, and combinations of both, meet every lighting requirement.





Pittsburgh Permaflector

FOR MORE LIGHTING KNOW-HOW

Write us your lighting interests—stores, offices, banks, buildings or schools. A bulletin covering the subjects will be mailed to you.

PITTSBURGH REFLECTOR COMPANY

404 OLIVER BUILDING • PITTSBURGH 22, PENNSYLVANIA

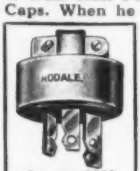
MANUFACTURER OF FLUORESCENT & INCANDESCENT LIGHTING EQUIPMENT

Permaflector Lighting Engineers in All Principal Cities

PITTSBURGH PERMAFLECTOR LIGHTING EQUIPMENT IS DISTRIBUTED BY BETTER ELECTRICAL WHOLESALERS EVERYWHERE

"My Day as an Electrical Contractor" OR "IT ALWAYS PAYS— TO SAY RODALE"
—by Ed Campbell

"Called my wholesaler the first thing to order some Polarized Armored Caps. When he told me about RODALE'S high-quality, long-lasting brass blades and screws, I said, O.K., it's RODALE Caps for me! *(Cat. No. 1201. With Cord Clamp — 20A — 250V — 3 Wire. O.D. 1¾" — Cord Hole. 625.)*



Cat. No. 1201

"Towards the end of the day I had to give an estimate on a factory power system. I also included in my calculations RODALE *Polarized Single Receptacles.* Their molded bakelite construction — with bronze contacts and brass screws and terminals — makes them outstanding for dependability and economy. They fit all standard single outlet plates. *(Cat. No. 1230. 20A — 250V — 3 Wire.)*

Cat. No. 1230

"Later one of my regular customers called about a wiring job in a new housing project. One of the first items on my list of supplies, naturally, was RODALE *Polarized Dual-Purpose Single Flush Receptacles* for basement installations for major appliances like washing machines, etc. They're always safe and sure, because they're made of molded bakelite with brass screws — and bronze contacts mounted on brass terminals to assure positive heat-free conductivity. Rust and corrosion resistant coating on strap, too. Accommodates Parallel and 3 Wire Caps. Fits all standard single outlet plates. *(Cat. No. 1030. 10A — 250V; 15A — 125V — 3 Wire.)*"

Cat. No. 1030

How about YOU? Are *you* enjoying the benefits of RODALE Underwriters' Listed Heavy Duty Polarized Caps and Receptacles? For catalog, write **Dept. ECM-9.**

If your jobber can't supply RODALE Polarized Caps and Receptacles, write us for list of suppliers in your area.

RODALE
MANUFACTURING CO., INC.
EMMAUS PENNSYLVANIA

ALBERT P. HILLS

recting the sales policies of the organization.

Other appointments made at that time were William C. Blanding, executive vice president; John R. Tuttle, vice president and treasurer; John G. Hummel, vice president and general manager — manufacturing; Hamilton Armstrong, vice president—plant operations; Robert J. Sloan, secretary; Walter F. Beach, controller; Erle R. Monesmith, vice president and general sales manager; Russel P. Northup, commercial vice president and assistant sales manager; Albert H. Clarke, commercial vice president, illumination, Frank J. Fancher, commercial vice president, condulets, and Kenneth W. Mackall, commercial vice president, traffic signals.

Florida Contractors Elect John Latour

John Latour of Daytona Beach, has been elected president as the Electrical Contractors Association of Florida was reactivated at a meeting in Orlando. Other officers named included V. L. Burkhardt, West Palm Beach, vice-president, and Fred Newcomb, Daytona Beach, secretary-treasurer.

The officers, together with the following, were named directors: Jim Baraco, Pensacola; P. E. Satchwell, Jacksonville; J. C. McMullen, West Palm Beach; W. F. Jeffreys, Orlando; W. A. Brinson, St. Petersburg; and Fred H. Stewart, Miami.

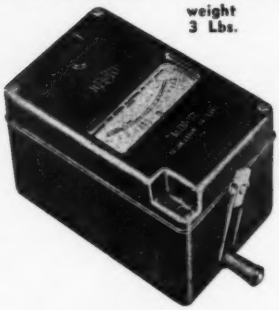
More than 72 members were present at the meeting.

IAEL Conference To Be Held in New Orleans

A very special program, designed to deal with matters of current interest, has been developed for the 16th An-

LOW PRICE SMALL SIZE

weight 3 Lbs.

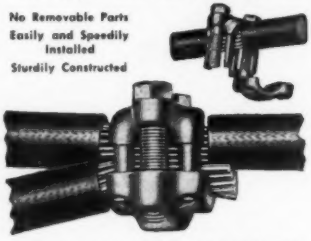


"MINOR" MEGOHMER
PINT SIZE INSULATION TESTER
500 VOLTS DC GENERATOR
Range 0–50 megohms. True Ohmmeter, independent of generator speed. Furnished with genuine leather carrying case, 6' test leads, 50 megographs.
Write for Bulletin No. 450
HERMAN H. STICHT CO., INC.
27 PARK PLACE NEW YORK 7, N. Y.

CLAMP and LOCK YOUR CONNECTIONS { THE K&H WAY

This
SWIVEL U-BOLT CONNECTOR
is designed to do just that . . .

No Removable Parts
Easily and Speedily Installed
Sturdily Constructed



MEET ALL REQUIREMENTS
85% Copper Alloy • Ample Strength
High Conductivity • Unaffected by Vibration
Moisture Resistant
Sizes Up to 1,000,000 CM.
Approved by Engineers
Specify K&H for YOUR Next Job
For More Details, Sizes and Prices
WRITE FOR CATALOG 5LC
KRUEGER & HUDEPOHL
2324-8 VINE ST. • CINCINNATI 2, OHIO

MITCHELL

module still America's NO.1 Commercial Lighting

REG U S PAT OFFICE

20% more light!

Yes, MITCHELL MODULE is *still* unequalled for effective light output, unequalled because inch for inch it delivers *more* light per operating dollar than any other louvered commercial fixture. MODULE'S exclusive Polystyrene plastic louver passes 20% MORE LIGHT than conventional metal louvers—saves more lighting dollars in *every* installation.

50,000 ways to get it!

And MITCHELL MODULE is *still* the *only* lighting system that *custom-fits any installation with standard low-cost units.* With just 4 simple, inexpensive "building blocks of light," MODULE creates *unlimited* custom-fitting lighting patterns. Because MODULE units fit together simply (both mechanically and electrically) patterns can be rearranged to meet changing needs—*at minimum cost.*

MODULE'S styling is enduring; stays beautiful, new. No ordinary fixtures can match MODULE—*still* the *only* lighting system that delivers *20% more light* and *custom-fits* any commercial interior at *lowest operating cost.*

only MITCHELL *makes* MODULE

MITCHELL MANUFACTURING COMPANY

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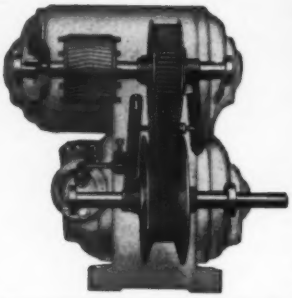
power modernization



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OUTSTANDING FEATURES: Infinite speeds—positive speed regulation—fingertip control—large indicator—positive pulleys—no springs—protected—balanced design—streamlined—Herringbone Rotor—through ventilation—shielded ball bearings—versatile mounting—NEMA dimensions—shock absorbing—quiet operation—rugged—compact—dependable—long life.

Ask for your copy of pictorial bulletin No. B-57 showing Sterling Electric Power Drives Turning The Wheels of Industry.

STERLING ELECTRIC MOTORS

Plants: New York 51, N. Y.; Los Angeles 22, California; Hamilton, Canada; Santiago, Chile. Offices and distributors in all principal cities.

Quality FASTENING DEVICES

FOR ALL TYPES OF MASONRY

1951 AERIAL VIEW OF ARRO

For more than 20 years, the Arro line of expansion shields, anchors, and toggle bolts has won a position of respect in many crafts and industries.

This respect is due to Arro's insistence upon high quality materials and top quality workmanship. There is no substitute for either . . . that's why we believe Arro products are your best buy.

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ARRO EXPANSION BOLT CO. • MARION, OHIO

nual Conference of the International Association of Electrical Leagues, which will be held at the Roosevelt Hotel, New Orleans, Louisiana, Wednesday, October 10 to Saturday, October 13, inclusive.

The Conference is open to representatives of all branches of the electrical industry interested in expanding the market for electrical products and services by cooperative means.

In addition to addresses on specific subjects, selected for their timeliness, there will be two half-day forums to provide opportunities for members of electrical leagues and other conferees to ask questions and to discuss the day-to-day problems met within league operations.

Hutson Colcock, president of the Electrical Association of New Orleans, the host organization, will make the address of welcome. He will be followed by a pertinent address on league operations presented by Leo Hirsch, who was the first president of the Electrical Association of New Orleans. Response, under the title of "The League's Are Ready" will be made by an official representative of the IAEL.

The general chairman of the Conference will be J. G. Waddell, president of the IAEL, who will be assisted in the conduct of overall affairs, and individual sessions by officers and directors of the organization.

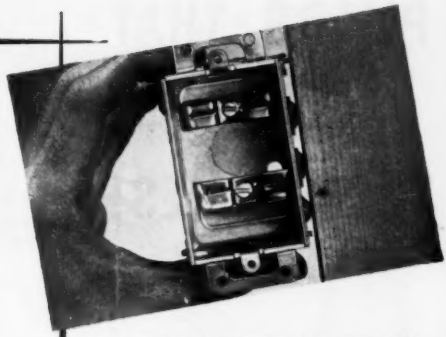
Important addresses will include the following: "The General Economic Outlook" by Dr. Dexter M. Keezer, director, Department of Economics, McGraw-Hill Publishing Company; "The Current Situation in the Appliance Market and Problems of Retailers" by C. W. Leihy, publisher, *Electrical Dealer;* "Why My Utility

HARD WORKERS at the annual convention of the New York State Electrical Contractors and Dealers Association at Saranac Inn, N. Y. were A. Lincoln Bush and A. A. A. Tuna both from New York City. Mr. Tuna was elected vice chairman of the Association.

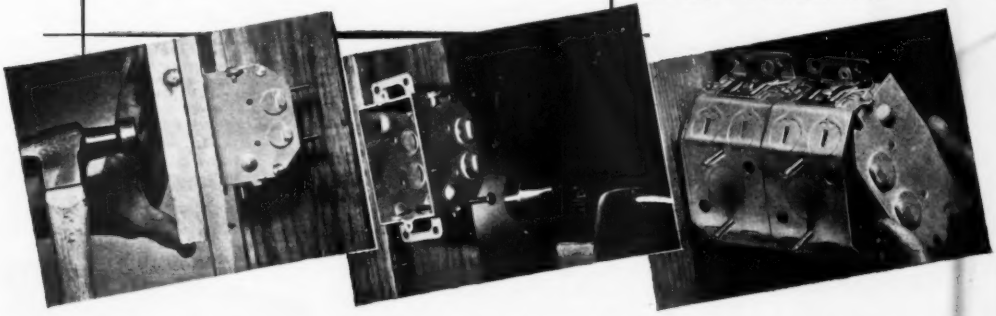
Which of these

5 LEVELOCK FEATURES

will help you most on your next wiring job?



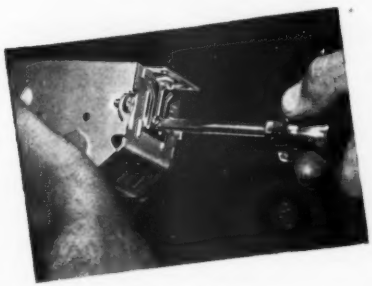
1. EASY TO LEVEL—CAN'T ROCK—Four leveling projections prevent rocking—level the box while you install it. Two of these projections on exposed side plate are side pryouts for extra-easy wiring. Get this important advantage in 2-, 2¼-, and 2½-inch-deep G-E Levelock boxes.



2. WON'T FALL APART WHEN CARPENTERS SCRIBE CUTOUTS—Exclusive Levelock action locks side plates securely. Box will not come apart in spite of construction abuse. No need to fish for boxes lost in partitions. This lock is a feature on 2-, 2¼-, and 2½-inch-deep Levelock boxes.

3. NAIL DIRECTLY TO STUDDING—For real speed with 2¼-inch and 2½-inch Levelock boxes just drive a nail through each nail-through hole without taking the box apart. Or, on any Levelock box, just nail through side plate to studding.

4. GANG SWITCH BOXES IN A MATTER OF SECONDS—General Electric developed the Levelock line for easy ganging. Just remove side plate, line boxes up together, draw up two screws, and boxes are tightly ganged.



5. HERE'S THE EASY WAY TO ADJUST SWITCH BOX EARS—Single-screw ears on 2¼-inch- and 2½-inch-deep boxes permit easy adjustment from beyond the edge of the box to ⅝ inch back of the edge of the box. One-eighth inch leveling marks scribed on box permit setting of ears to any wall thickness.

Try G-E Levelock Switch Boxes for new installation speed

Standardize on G-E Levelock switch boxes for extra convenience on the job. They're designed to add speed to wiring by eliminating the nuisances that tend to slow up jobs. Try these Levelock boxes on your next job, and you'll know what convenience means.

SP6972	2½" deep for BX* cable
SP6972D	2½" deep for nonmetallic cable
SP6974D	2¼" deep for nonmetallic cable
SP6974DLE	2¼" deep (less ears) for nonmetallic cable

Section C60-918, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

**Registered Trade Mark of General Electric Company*

NEW SHALLOW BOX

incorporates leveling and locking features of the Levelock line.

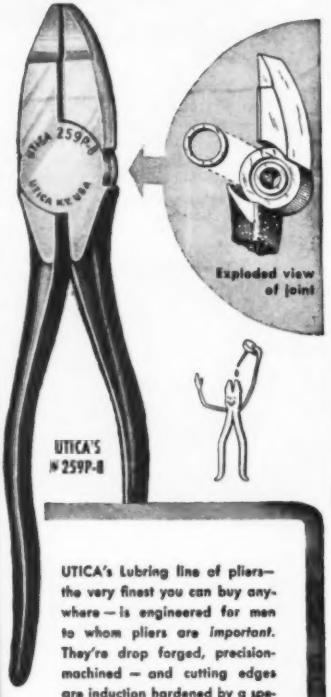
SP6976
for BX* cable

SP6976D
for nonmetallic cable

You can put your confidence in—

GENERAL ELECTRIC

PLIERS THAT OIL THEMSELVES!



UTICA's Lubring line of pliers—the very finest you can buy anywhere—is engineered for men to whom pliers are *important*. They're drop forged, precision-machined—and cutting edges are induction hardened by a special UTICA process.

Each UTICA "Lubring" pliers has a ring of porous iron floating in the joint. This ring serves as a tiny reservoir for oil and releases it to the joint *as it's needed*.

In these days of limited replacements, why not make sure you get the long life and quality that go with UTICA?

UTICA Drop Forge & Tool Corp.
Utica 4, New York
In Canada:
Adlam Tool & Supply Co., Ltd., Montreal
Wallis-Irons, Ltd., Winnipeg

It Pays — Quality — U TI CA — To Use — Tools

AND THE WORLD'S BEST TOOLS ARE MADE IN U. S. A.

Thinks It's Good Business to Support an Electrical League" by W. T. Clark, manager, residential sales, Cleveland Electric Illuminating Company; "Legal Problems Encountered in Trade Association Activities" by Henry P. Fowler, manager, Trade Association Department and General Counsel, United States Chamber of Commerce; "Recent Developments in the Field of Television" by Glen McDaniel, president, Radio-Television Manufacturers Association; "Profit Possibilities for Dealers in Appliance Service" by H. E. Putnam, customer service manager, Landers, Frary & Clark; "The League's Part in Maintaining Industry Morale and Keeping the Public Informed" by K. G. Gillespie, vice president, The Electric Association of Kansas City, Mo.; "Adequate Wiring Programs That Work" by Fred Sudduth (electrical contractor), of Sudduth's and "Training Dealer Salesmen" by E. J. Hegarty, director sales training, Westinghouse Electric Corporation.

Another item of considerable importance on the program will be a discussion of "The Effects of the Arsenal Economy Situation on the Availability of Critical Materials for the Manufacturers of Electrical Appliances and Equipment" by a speaker to be selected, preferably someone from the NPA.

A new idea has been introduced into one of the open forums. It is programmed, "I Want to Know," and is to be a reverse-panel discussion on the subject of league organization and operation where the panel will ask questions rather than provide answers. The panel members are: Don E. Rosenthal, Omaha, Nebraska; R. J. Samson, Kansas City, Missouri; Jack Canady, Phoenix, Arizona; Ray L. Halverson, Salt Lake City and Glen L. Logan, Los Angeles.

The other open forum will discuss five subjects: Grass Roots Meetings for Farmers, A. H. Kessler, Minneapolis; Electric Bedcovering Promotion, J. Clark Chamberlain, San Diego; Television Service Training Program, V. W. Hartley, Los Angeles; Defense Mobilization Survey, R. J. Samson, Kansas City, Mo., and Light Conditioning, J. R. Waters, Fairmont, W. V.

There will be two special luncheons with guest speakers. One on Wednesday, October 10, will be addressed by Clifton L. Ganus, Jr., professor at Harding College whose subject will be "Americanism and the Free Enterprise System." On Friday, October 12, the speaker will be S. L. Drumm, vice president, New Orleans Public Service Inc., whose subject will be "The Joint Utility Program for the Development of the mid-South."

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From 1/6 to 1/3 hp incl., 50/60 cycles

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FRANKLIN PARK, ILLINOIS

The Business Session will take place on October 13. In addition to general business, the election of divisional chairmen and officers for 1952 will take place.

C. H. Lang, G.E., Given New Responsibilities

Chester H. Lang, vice president of the General Electric Company since 1941, has been appointed to a new post in charge of public relations. Mr. Lang's office will be at the company's executive offices in New York.

Pointing out that the responsibilities of the public relations post have been considerably broadened as an integral part of policy forming top management, Ralph J. Cordiner, G E. president, said: "Mr. Lang's experience in many phases of the company's operations eminently qualifies him for the enlarged responsibilities of his new appointment."

Book Review

Industrial Electronics

In field of industrial electrification, the application of electronic circuits and components is constantly increasing. To meet the demand for practical yet comprehensive information about the basic essentials of applied electronics in industry, excluding communications, John M. Cage, Professor of Electrical Engineering at Purdue University, has written "Theory and Application of Industrial Electronics".

Among subjects treated are: polyphase rectifiers using ignitions and thyratrons, servomechanisms and the dynamics of closed-loop systems, electronic control of motors and generators, resistance-welder controls, induction and dielectric heating, oscillators and pulse techniques, basic timing circuits, and such miscellaneous applications as the Precipitron type of electrostatic air cleaner and industrial X-Ray.

The author has taken care to be orderly and constructive in developing the material. As the book progresses, the fundamental concepts and basic circuits set forth serve to integrate the technique of industrial electronics. A table of symbols and numerous circuit diagrams, characteristics charts, tables, drawings, and photographs provide ease of understanding. The chapters are grouped to treat successively of devices with similar theoretical derivations, and each chapter is followed by a number of problems combining theory and application.

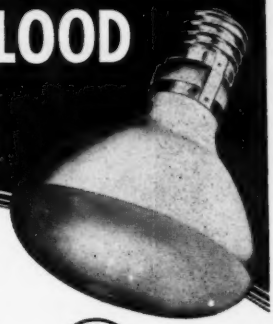
Published by the McGraw-Hill Book Company, Inc., 330 West 42nd St., New York 18, N. Y., the book is priced at $4.75.

MORE LIGHT—*Where you want it!*

RADIANT HI-FLOOD

Reflector Weatherproof

FLOODLAMPS



Radiant Hi-Flood Lamps offer advantages no other type lamps can give you. Weatherproof glass resists sudden temperature changes, moisture, and flying insects. No expensive enclosed fixtures needed. Internal silver reflecting surface unaffected by dirt or corrosion, so you always get maximum light, directed right where you want it.

R-40 Hi-Floods are available in 200, 300, and 500 W, standard or high voltage, to fit medium or mogul sockets. R-60 sizes include 750 and 1,000 W.

Write for prices and Technical Bulletin 80 now.

R — *The symbol of quality in lamps*

RADIANT LAMP CORPORATION
303 Jelliff Avenue,
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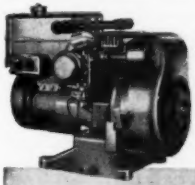
Manufacturers of Lamps for PROJECTION • FLOODLIGHT • SPOTLIGHT MOTION PICTURE PRODUCTION • SOUND REPRODUCTION • AERONAUTICAL SPORTS LIGHTING AND GENERAL SERVICE • RECTIFIER BULBS

1 MAN CAN DO THE WORK OF A CREW...

with an

ONAN PORTABLE ELECTRIC PLANT

Use fast-working, cost-cutting electric tools on every job. Lightweight, Onan air-cooled, engine-driven electric plants supply instantly-available power *anywhere* for lights, drills, saws, pipe-threaders, planers, spades, and tampers. Carry 'em, wheel 'em, or truck 'em right to the spot and plug-in for all the power you need. Equipped with carrying handles or dolly-mounted.



A.C. Models: 350 to 35,000 watts.

D.C. Models: 1200 to 15,000 watts.

Diesel Plants: 2,500 to 55,000 watts.

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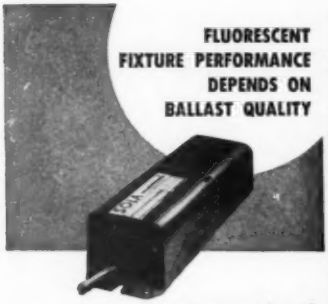


SOLA *Sequenstart*
CONSTANT VOLTAGE BALLASTS

reduce air conditioning load

lower operating temperatures and increased efficiency can save as much as $1.14 investment in air conditioning per lamp.

Temperature rise of the 2-lamp SOLA Sequenstart* Ballast is exceptionally low, compared to the conventional lag-lead types. The patented SOLA Sequenstart* circuit greatly reduces the quantity of metal required in the ballast, minimizing iron and copper losses. This reduces the high ambient temperature surrounding ordinary ballasts.

In addition to cooler lighting, the circuit design of SOLA Sequenstart* Ballasts (which are wired in series rather than in parallel) results in greater efficiency. This means less wattage loss, and consequently less wattage necessary for a specified lighting level.

When you next purchase, specify or install fluorescent lighting, it will pay you to inquire of the fixture manufacturer about the ballast installed in the fixture.

Employment of SOLA Sequenstart* Ballasts for fluorescent lighting can make a very significant saving on installed and operating cost of an air conditioning system. Write for the complete story of air conditioning savings and increased fluorescent lighting performance through SOLA Sequenstart* Ballasts. Ask for Bulletin J-FL-144.

Compare Ballast Performance—Then Specify The Outstanding Performer.

SOLA
Sequenstart
CONSTANT VOLTAGE BALLASTS

SOLA ELECTRIC CO.
4633 W. 16th St., Chicago 50, Ill.

CHARTER MEMBERS and still active on the executive committee at 25th Anniversary of the Chicago Electrical Maintenance Engineers are: (L to R) J. J. McKenna, Eagle-Pitcher Lead Co.; P. J. Anderson, Link-Belt Co.; and T. C. Hayes, Wilson & Company.

Among the Manufacturers

Headquarters Announcements

General Electric Company, Schenectady, N. Y.—Arthur R. Hines, assistant manager of marketing for the company; Dr. Louis T. Rader, manager of engineering of the Control Divisions.

Westinghouse Electric Corp., Pittsburgh, Pa. — Hendley Blackmon, manager of engineering association activities.

Sylvania Electric Products, Inc., Warren, Pa.—P. M. Pritchard, general sales manager for the Parts Division. Benjamin Electric Mfg. Co., Des Plaines, Ill.—R. Allen Benjamin, vice-president and secretary; Arthur E. Swedenborg, assistant general sales manager.

P. R. Mallory & Co., Indianapolis, Ind. —George C. Mercer, director of purchasing.

Conduit Nipple Mfg. Co., Pittsburgh, Pa.—J. Clifton Vandermast, vice-president in charge of sales.

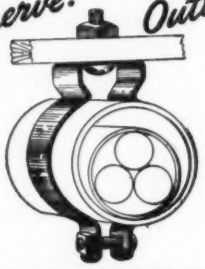
Industrial Tape Corp., New Brunswick, N. J.—Stephen J. Geoghegan, vice-president in charge of materials.

Wheelco Instruments Co., Chicago, Ill. —formation of Wheelco Instruments of Canada, Ltd.

MINERALLAC

Steel HANGERS, CLIPS, STRAPS

Outserve! Outlast!



Minerallac Cable, Conduit and Messenger Hangers are STEEL. Easier, quicker to install; permit speedy, compact wiring; economical. Also in Everdur . . . Porcelain insulating Bushings available.

• • •

Jiffy STEEL Clips (Pipe-clamp) require only one screw, nail or bolt; rib-strengthened; for hanging pipe, conduit, BX cable, mounting coils, etc. Millions in use.

• • •

Steel Straps for Messenger-cable services on outlet boxes; may be used in conjunction with hangers.

• • •

Order from your Electrical Wholesaler. Send for literature.

MINERALLAC ELECTRIC COMPANY
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What a line!
We're referring to the U. S. Electric Plant line, of course —over 300 models to choose from! "U.S." builds units from ½ to 150 kw, AC and DC. Backed by 60 years of manufacturing experience
Write for literature.
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UNITED STATES MOTORS CORPORATION
US
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Set Studs into Steel or Concrete in seconds

with the

VELOCITY-POWER DRIVER

Better 3 Ways!

1. IT'S SIMPLE

One-handed operation. Load—position—fire. Stud imbedded—job done. Two basic parts—barrel and firing unit—easy to service. Integral cartridge bans matching and fitting—ready to use.

2. IT'S VERSATILE

Drives studs easily into steel or concrete. Interchangeable barrels permit driving of either ¼ or ⅜-in. studs from same firing unit. Wide range of studs available—solid head, internal or external threaded types.

3. IT'S SAFE

Center-fire cartridges plus spring-loaded safety arm that must be rotated 180 degrees and held before stud can be fired makes accidental discharge impossible. Barrel design and long bearing area of piston avoids ricochet, flash, recoil. Cartridge assemblies assure right load for the job. Write for Bulletin No. TA-17.

DEALERS WANTED

Big, profitable sales opportunity in a broad market with this time, labor and money saving tool for maintenance, repair and construction work. Cartridge-studs bring repeat business. Act now!

VELOCITY POWER TOOL CO.

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Pittsburgh 8, Pa.

The Miller Company, Meriden, Conn. —L. M. Grawemeyer, sales manager of the Illuminating Division.

General Cable Corp., New York, N. Y. —Howard A. Reid, sales promotion and market analysis manager.

Irvington Varnish and Insulator Co., Irvington, N. J.—E. A. Freiburger, general sales manager of the Coating Division; Jean H. Rooney, sales service manager; James D. Smith, varnish sales manager; Franklin Railway Supply Co., New York, N. Y., exclusive representative in the railroad field.

The Kellex Corp., New York, N. Y.—has changed name to Vitro Corporation of America.

Westinghouse Electric Corp., Bloomfield, N. J.—George E. Lambert, administrative assistant to the vice-president in charge of the Lamp Division.

Telechron Dept., General Electric Company, Ashland, Mass.—Donald E. Perry, industrial sales manager; M. Joseph Dunn, clock sales manager; Edwin C. Pease, merchandising manager for clocks and industrial products.

Allis-Chalmers Mfg. Co., Milwaukee, Wis.—J. L. Singleton and R. S. Stevenson, elected to the board of directors of the company; W. E. Hawkinson, vice-president, secretary and treasurer.

United States Rubber Co., New York, N. Y.—H. E. Humphreys, Jr., president, elected chairman of the board of directors.

Sierra Electric and Mfg. Co., Los Angeles, Calif.—announces the purchase of McDonald Mfg. Co.; Lee T. Bordner, president.

General Electric Company, Bridgeport, Conn.—J. W. McNairy, manager of the company's Appliance Park project at Louisville, Ky.

Royal Electric Co., Inc., Pawtucket, R. I.—announces the acquisition of Nu-Way Electric Mfg. Co., formerly of Brooklyn, N. Y.

Sylvania Electric Products, Inc., New York, N. Y.—Chalmer J. Carothers, merchandising supervisor of wiring devices.

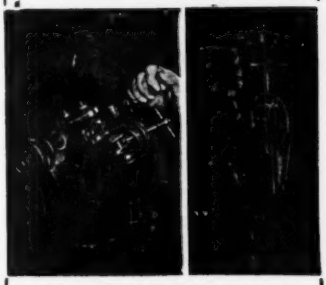
Joleco Corporation, St. Louis, Mo.—E. L. Ehret, chief engineer; Fred J. Buchal, sales manager.

BullDog Electric Products Co., Detroit, Mich.—announces a new marketing program for BullDog's Vacu-Break Master Switches.

General Electric Company, Fort Wayne, Ind.—Edmund C. Schorr, sales manager of the Specialty Transformer and Ballast Department.

MARTINDALE

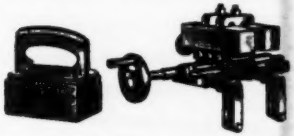
COMMSTONE HOLDERS



Hold Commstones rigid and true for concentric re-surfacing of commutators and slip rings while running at normal speeds in their own bearings. Interchangeable boxes 1", 2" and 3" wide handle grinding jobs up to 4¼" wide.

BLOWERS AND VACUUM CLEANERS

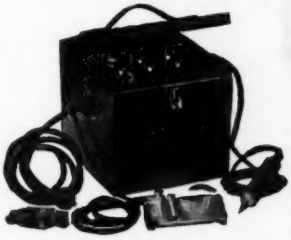
MARTINDALE COMMSTONES AND COMMUTATOR GRINDING TOOLS



MICA UNDERCUTTERS FOR SLOTTING COMMUTATORS

Nine Motor Driven Types

HEAVY DUTY ETCHER



Mark motors and other equipment with service data. Three other styles available.

Write for 64-page Catalog describing these and many other products for Industrial Maintenance, Safety and Production.

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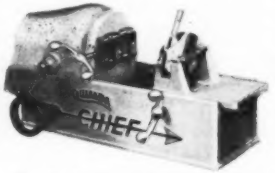
QUIJADA CHIEF

PIPE AND BOLT THREADER



Check these average QUIJADA threading times against your present methods

CONDUIT SIZE	½"	1"	1½"	2"
THREADING TIME	11 sec.	17 sec.	20 sec.	23 sec.
REAMING TIME	You ream as you thread			
CUTTING TIME	5 sec.	5 sec.	7 sec.	9 sec.
TOTAL TIME	16 sec.	22 sec.	27 sec.	32 sec.

QUIJADA SPEED KEEPS YOU HIGHLY COMPETITIVE!

Compare the time totals shown on this table with your present threading, reaming and cutting time. See for yourself how much you can save on each job. Find out how such Quijada features as motor driven automatic chucking, quick opening die heads and easy portability save time and money on ALL jobs.

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Regional Appointments

MIDDLE ATLANTIC

Rome Cable Corp.: E. T. Buchenmaier, New York, N. Y., district sales manager for the New York area.

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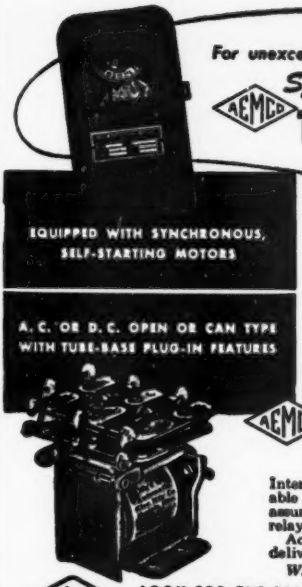

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QUESTIONS ON THE CODE

[FROM PAGE 139]

standing four one-minute immersions in a standard copper sulphate solution, would be waved for the duration of the present National Emergency, and that electrical metallic tubing would be considered acceptable for labeling if protected by zinc capable of withstanding two one-minute immersions".

Official NEC Interpretations

INTERPRETATION NO. 368

Issued April 2, 1951

Section 5015-a
Location of Seal Fittings

QUESTION: Where it passes through a wall or partition which separates a hazardous from a nonhazardous area, is it the intent of subparagraph 3 of section 5015-a of the National Electrical Code to specify on which side of the partition the seal shall be located?

Answer: No, the desired safeguarding will be secured whether the seal is installed in the hazardous area or on the opposite wall or partition.

INTERPRETATION No. 369

Issued April 18, 1951

Section 5015
Seal Fitting

STATEMENT: A lighting circuit switch in a concealed conduit below the five foot level from the floor of a hospital operating room, is installed in a Type EFS condulet fitting. Located above it in the conduit run is an external sealing fitting, such as Type EYS condulet.

QUESTION 1: Does section 5015, paragraph a, subparagraph 1, and paragraph c, require the use of the second and sealing condulet (Type EYS) not withstanding its position must make it concealed within the building structure.

ANSWER: Yes.

QUESTION 2: Will a seal in the conduit entering this switch box, employing a non-hardening compound inserted into the conduit raceway from the switch compartment, serve as an acceptable substitute for the sealing condulet and compound specified in section 5015 paragraph c?

ANSWER: No.

INTERPRETATION NO. 373

Issued June 5, 1951

Sections 2101, 2116, 2123, 2451, 3527, 3650, 3651, 3652, 4222, 4322-c, 4341, 92401
Feeders-Busways

QUESTION 1: Is it the intent of Article 364 of the National Electrical Code to permit Trol-E-Duct feeders or sub-feeders fused to maximum capacity

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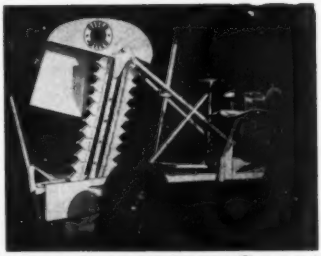

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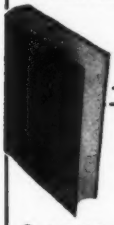

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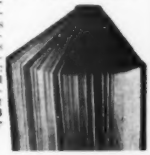

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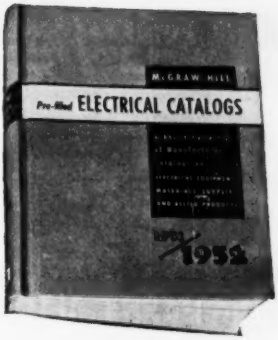

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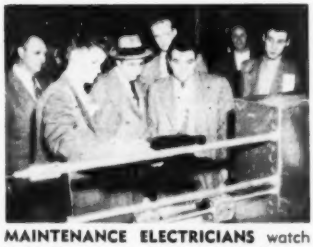
ANSWER: No, applicances, cords and fixtures may be connected only to branch circuits. See sections 4222, 2101 and 4341. The busway described is obviously a feeder rather than a branch circuit.

QUESTION 2: Is it the intent of Article 364 of the National Electrical Code to permit Trol-E-Duct feeders or sub-feeders fused to maximum capacity, equipped with fuseless 20-ampere receptacles to which lighting fixtures and appliances are connected thereto by means of fusible "Elmenco" attachment plug caps. Length of Trol-E-Duct run unlimited and no restrictions as to number of receptacles.

ANSWER: No. Fuseless receptacles may be connected only to branch circuits, never to feeders. See section 2123 and 4322 (c). Furthermore, the overcurrent portion of the plug-in connection required by section 3650 must contain standard branch circuit overcurrent protection. The type 3AG glass tube fuses used with the "Elmenco" attachment plug caps are approved only for special applications, never for branch circuit protection. See section 2451 and 92401. A plug-in busway (when used as a feeder) should be viewed as a stretched out or elongated panelboard or distribution center and as reqiring the same standard for branch circuit protective devices as would be required at any distribution center.

QUESTION 3: Is it the intent of the National Electrical Code that lighting and appliance devices be connected to branch circuits as outlined in paragraphs 3651 and 3652 of Article 364 of the National Electrical Code whether each device is fused or not with approved attachment plug caps.

ANSWER: Yes. Busways used as branch circuits are comparable to and should be regulated the same as multi-outlet assemblies. (See Article 100 and sections 2116 and 3527.) The length of such branch circuit busways are generally limited to not more than three times the ampere-rating of the branch circuit. This is a rough approximation of the 1½ ampere loading assumed for each 5 feet of multi-outlet assemblies.



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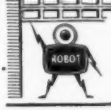

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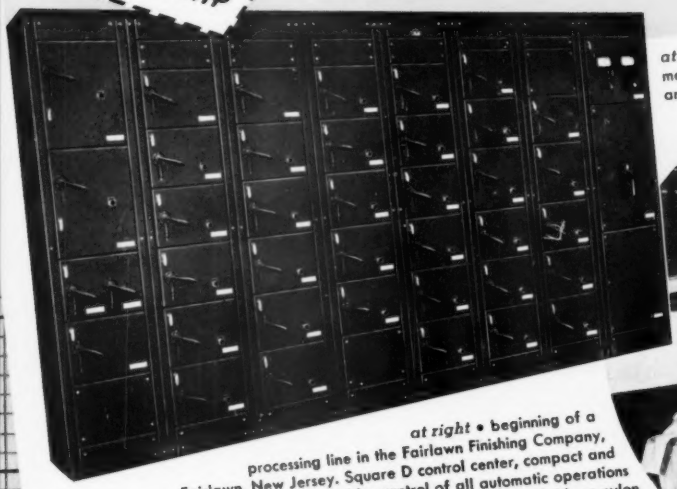

at left • Control center with main breaker, metering panel, 33 combination starters and 6 branch breakers.

at right • beginning of a processing line in the Fairlawn Finishing Company, Fairlawn, New Jersey. Square D control center, compact and out of the way, provides control of all automatic operations in applying water-repellent finish on nylon.

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